CLIMATE ANALYSIS CENTER

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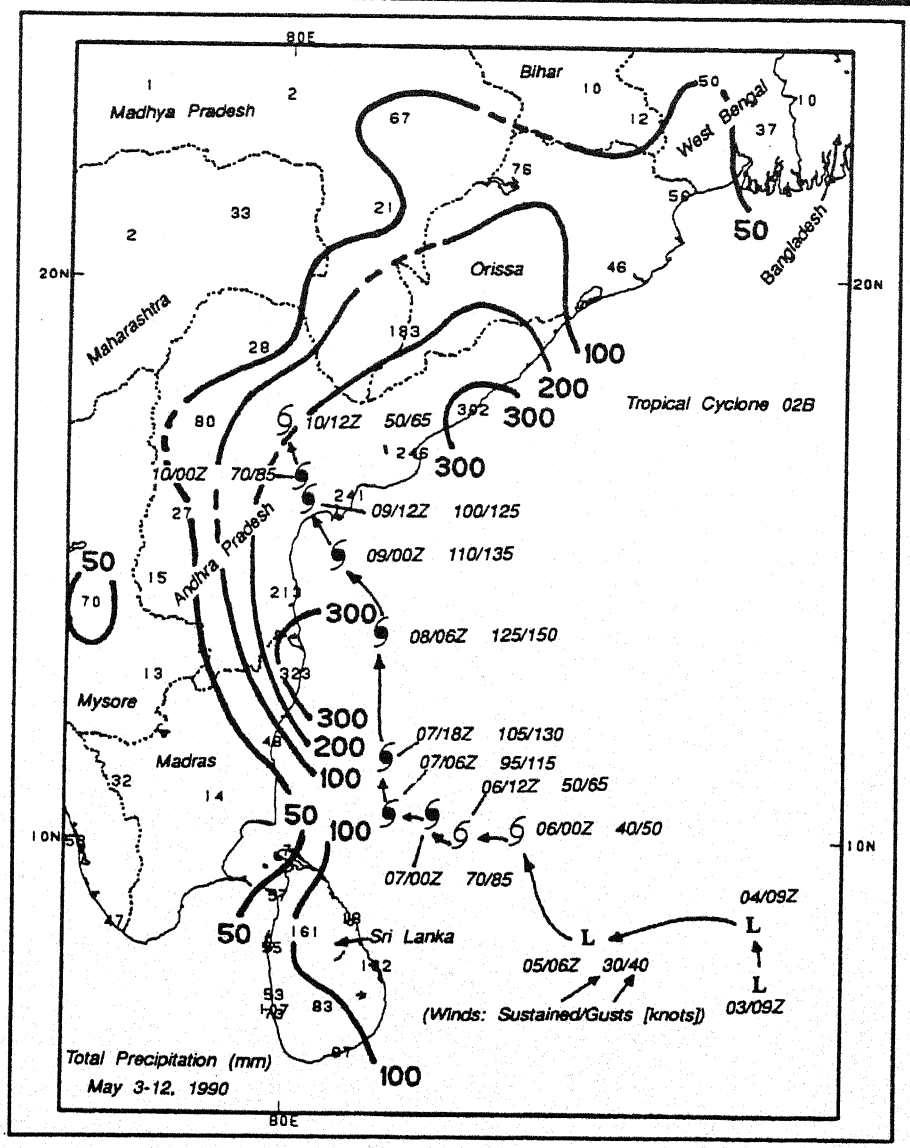
APRIL 1990
UNITED
STATES
CLIMATE
SUMMARY

WEEKLY CLIMATE BULLETIN

No. 90/19 Washington, DC May 12, 1990



AN INTENSE TROPICAL CYCLONE, BELIEVED TO BE THE MOST SEVERE IN AT LEAST A DECADE IN INDIA, HIT THE RICH AGRICULTURAL, LOW-LYING AREA OF ANDHRA PRADESH STATE. TORRENTIAL DOWNPOURS, WITH STORM TOTALS EXCEEDING 300 MM, AND DEVASTATING WINDS (MAXIMUM SUSTAINED WINDS OF 125 KNOTS AND GUSTS UP TO 150 KNOTS) COMBINED TO PRODUCE WIDESPREAD, SEVERE FLOODING. ACCORDING TO PRESS REPORTS, 6.5 MILLION PEOPLE WERE AFFECTED BY THE STORM, HUNDREDS OF LIVES WERE LOST, AGRICULTURAL DAMAGE WAS ESTIMATED AT $600 MILLION, OVER 100,000 FARM ANIMALS PERISHED, AND MORE THAN 450,000 ACRES OF FARM LAND WERE DESTROYED.

UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE–NATIONAL METEOROLOGICAL CENTER
CLIMATE ANALYSIS CENTER

WEEKLY CLIMATE BULLETIN

This Bulletin is issued weekly by the Climate Analysis Center and is designed to indicate, in a brief concise format, current surface climatic conditions in the United States and around the world. The Bulletin contains:

- Highlights of major climatic events and anomalies.
- U.S. climatic conditions for the previous week.
- U.S. apparent temperatures (summer) or wind chill (winter).
- U.S. cooling degree days (summer) or heating degree days (winter).
- Global two–week temperature anomalies.
- Global four–week precipitation anomalies.
- Global monthly temperature and precipitation anomalies.
- Global three–month precipitation anomalies (once a month).
- Global twelve–month precipitation anomalies (every three months).
- Global three–month temperature anomalies for winter and summer seasons.
- Special climate summaries, explanations, etc. (as appropriate).

Most analyses contained in this Bulletin are based on preliminary, unchecked data received at the Climate Analysis Center via the Global Telecommunications System. Similar analyses based on final, checked data are likely to differ to some extent from those presented here.

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GLOBAL CLIMATE HIGHLIGHTS

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF MAY 12, 1990

1. *Central United States*:

SOUTH–CENTRAL PLAINS DRY OUT AS DOWNPOURS DRENCH CENTRAL GULF COAST.

Only 15 mm to 25 mm of rain dampened the south–central Great Plains from northeastern Texas across southeastern Oklahoma and western Arkansas, allowing the region to begin recovering from some of the worst flooding of the century. Inundating rainfall, however, soaked much of the central Gulf Coast from east–central Texas eastward into the Florida Panhandle. Most locations measured 50 mm to 150 mm, although the southern half of Mississippi recorded 150 mm to 295 mm of rain and several instances of urban and river flooding [17 weeks].

2. *East–Central South America*:

HOT WEATHER RETURNS TO WEST, DIMINISHES IN EAST.

"Indian Summer" came to an end across southern Brazil as seasonable temperatures were observed for the second successive week. Farther west, however, warm weather returned to northern Argentina and southern Paraguay where weekly temperatures averaged 3°C to 5°C above normal [4 weeks].

3. *Scandinavia, the British Isles, and Northwestern Continental Europe*:

SUMMER–LIKE WARMTH CONTINUES.

Although near normal temperatures returned to the British Isles, warm weather dominated the remainder of the area once again as most locations across the southern half of Scandinavia and throughout eastern, central, and northern continental Europe observed departures between +3°C and +5°C. Portions of southwestern Scandinavia and the Germanies were exceptionally warm, with weekly temperatures averaging as much as 7°C above normal [5 weeks].

4. *Coastal Equatorial Africa and The Sahel*:

COASTAL DRY SPELL ENDS, BUT HOT WEATHER CONTINUES PLAGUING THE SAHEL.

Tropical thundershowers dropped 40 mm to 90 mm of rain across most of coastal equatorial Africa, bringing and end to the slow start of the 1990 rainy season [Ended after 8 weeks]. Farther north, temperatures above 45°C baked portions of Niger and Senegal while departures around +2°C kept the recent hot spell intact dry [5 weeks].

5. *Southern Ethiopia and Somalia, Kenya, Uganda, and northern Tanzania*:

ANOTHER WEEK OF LIGHT TO MODERATE RAINFALL STOPS WET SPELL.

Although 40 mm to 80 mm of rain dampened western Kenya, most locations measured only 10 mm to 35 mm, bringing and end to the recent spell of wet weather [Ended after 10 weeks].

6. *Eastern India and Sri Lanka*:

TYPHOON 2B BATTERS REGION.

Tropical Cyclone 2B formed in the southern Bay of Bengal early last week, then pursued a westward course toward Sri Lanka. After deluging eastern portions of the island, the Typhoon suddenly veered northward, battering eastern Madras and Andhra Pradesh states before making landfall along the east–central coast of the latter state. Highest sustained winds reached 230 kph, with peak gusts approaching 280 kph, shortly before landfall, making 2B the most intense tropical cyclone to affect eastern Indian in almost a decade. In addition, the storm dumped 200 mm to 320 mm of rain on the eastern coasts of Sri Lanka, and the states of Madras and Andhra Pradesh, with up to 127 mm recorded during a single day. According to press reports, Typhoon 2B caused widespread coastal and lowland flooding, severe structural damage, and more than 450 fatalities [Episodic Event].

7. *Southeastern China, Taiwan, and Southern Japan*:

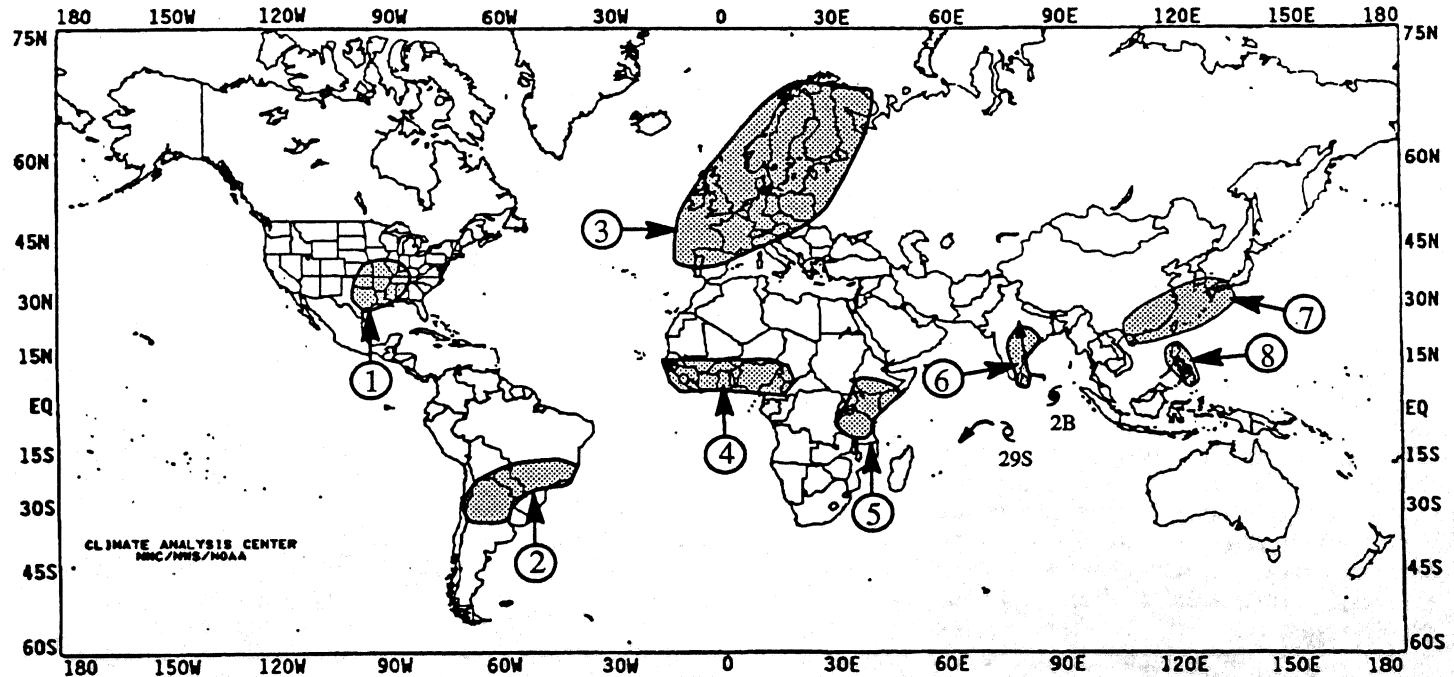
TORRENTIAL DOWNPOURS RETURN TO SOUTHEASTERN CHINA.

Heavy precipitation (between 100 mm and 220 mm) returned to much of south–central and southeastern China as well as the Nansei Islands between Taiwan and Kyushu Island, Japan (including Okinawa). Some flooding was reported across south–central China, where isolated locations were deluged by daily amounts as great as 162 mm. Elsewhere, 30 mm to 80 mm of rain kept moisture surpluses high [7 weeks].

8. *The Philippines*:

SCATTERED LOCATION EXPERIENCE RELIEF.

Ample rainfall brought relief to scattered portions of the country. Intense rainfall (around 315 mm) deluged extreme northeastern Luzon Island while 30 mm to 80 mm dampened the southern half of the island. Unfortunately, little or no rain fell across the remainder of the nation as long–term precipitation deficits persisted [10 weeks].



EXPLANATION

TEXT: Approximate duration of anomalies is in brackets. Precipitation amounts and temperature departures are this week's values.

MAP: Approximate locations of major anomalies and episodic events are shown. See other maps in this Bulletin for current two week temperature anomalies, four week precipitation anomalies, long–term anomalies, and other details.

UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

FOR THE WEEK OF MAY 6 – MAY 12, 1990

For the first week since early April, light rains fell on most of the south–central Great Plains, providing some relief from flooding problems in northern Texas, eastern Oklahoma, and western Arkansas. Farther south, however, heavy rains in eastern Texas, southern Arkansas, and much of Louisiana, coupled with still–rising downstream river levels, particularly along the Red and Trinity Rivers, produced extensive and severe flooding in the west–central Gulf Coast region and the lower Mississippi Valley. Towards the week's end, strong thunderstorms inundated the central Gulf Coast states, creating flooding in portions of southern Mississippi, Alabama, and the Florida panhandle.

Two strong storm systems generated numerous outbreaks of severe weather across the central and eastern U.S. Meanwhile, heavy late–season snows whitened parts of the northern Cascades, the northern and central Rockies, and the western Great Lakes region. Early in the week, 12 inches of snow blanketed Stampede Pass, WA, the Big Horn Mountains in Wyoming, and the Colorado Rockies. Later in the week, sections of southeastern Wisconsin near Milwaukee received as much as 8 inches of snow while the Upper Peninsula of Michigan measured up to a foot. In the West, unseasonably cold conditions prevailed across the Pacific Northwest and northern Rockies early in the week while warm, dry, and windy weather occurred in southern sections. Precipitation was generally light in both Alaska and Hawaii while temperatures averaged slightly above normal in Alaska and near normal in Hawaii.

During the first part of the week, high pressure located over the central and southern U.S. kept the eastern two–thirds of the nation generally precipitation–free. Farther west, however, a cold front pushed eastward into the Rockies, bringing light precipitation and gusty winds to the Pacific Northwest and northern Rockies. Behind the front, extremely cold air dropped temperatures close to freezing in western Washington and Oregon while heavy snows fell on the northern Cascades and Rockies.

By mid–week, the cold front tracked into the nation's midsection, triggering showers and thunderstorms from the southern Great Plains northeastward into the upper Midwest. An upper–air disturbance produced intense thunderstorms along the central and eastern Gulf Coast. Many of these thunderstorms generated severe weather throughout the aforementioned regions. Fortunately, the southern half of the front moved rapidly through the water–logged south–central Great Plains, keeping rainfall amounts relatively low. A deep low pressure center located over the upper Great Lakes funnelled in very cold air and dropped heavy late–season snow on parts of the upper Midwest. Farther west, readings plunged into the teens in Wyoming. Rawlins, WY bottomed out at 13°F on Wednesday morning, their lowest May temperature since 1951.

Towards the week's end, the cold front pushed off the East Coast by early Friday, but not before producing severe thunderstorms in the mid–Atlantic and Florida. A storm system developed in the southern Rockies and trekked northeastward, dumping unwanted rain on the south–central Great Plains and lower Mississippi Valley. Additional outbreaks of severe weather hit the nation's midsection as the system rapidly intensified. Late on Saturday and into early Sunday, strong thunderstorms produced flash flooding in the lower Mississippi Valley and the central Gulf Coast states. In contrast, most of the West was warm and dry.

According to the River Forecast Centers, the greatest weekly precipitation totals (more than 4 inches) occurred in eastern Texas, portions of Louisiana, in the Florida panhandle, extreme southeastern Florida, and in central Iowa and north–central Illinois (Table 1, page 3). In southern Mississippi, intense thunderstorms dumped up to 10 inches of rain during late Saturday and early Sunday, but most of the rain fell just after midnight, thus missing the May 6–12 time period. Elsewhere, heavy amounts (more than 2 inches) were observed in parts of the southern Great Plains, the lower Mississippi Valley, along the central Gulf Coast, in the southern Appalachians, the lower Missouri, western Ohio, and middle Mississippi Valleys, the mid–Atlantic, and most of New England.

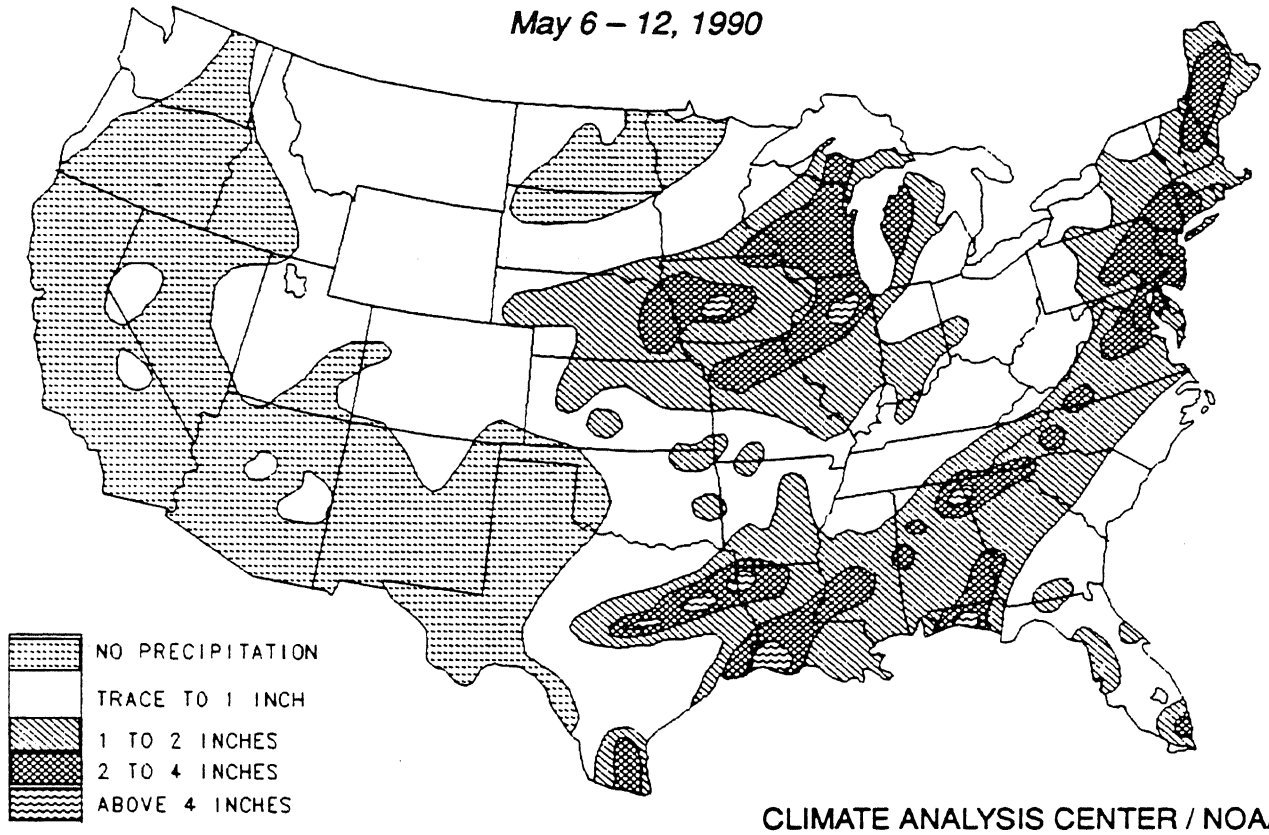
Light to moderate totals were recorded in the Pacific Northwest, the northern half of the Rockies, and throughout much of the eastern half of the country. Little or no precipitation fell along the southern three–quarters of the Pacific Coast, in most of the Intermountain West, the southern halves of the Rockies and High Plains, the upper Rio Grande Valley, the northern Great Plains, and southwestern Florida.

Colder than usual conditions dominated much of the lower 48 states with the exception of the Southwest, southern Florida, and northern Maine. As a result, the greatest positive departures (more than +5°F) were limited to the desert Southwest. Highs near 100°F were confined to the desert Southwest, interior California valleys, and southern Texas. In Alaska, however, unseasonably mild weather returned to most of the state after last week's near normal temperatures (Table 2). Since early March, weekly temperatures have generally averaged well above normal temperatures across much of Alaska.

Unseasonably cold weather prevailed throughout the contiguous U.S., especially in the upper Missouri and the Tennessee Valleys and the southern Appalachians, where temperatures averaged more than 6°F below normal (Table 3). A blast of cold Canadian air sent readings below freezing in the northern Intermountain West, Great Basin, Rockies, northern third of the Plains, upper Midwest, Great Lakes region, and the northern Appalachians.

OBSERVED PRECIPITATION

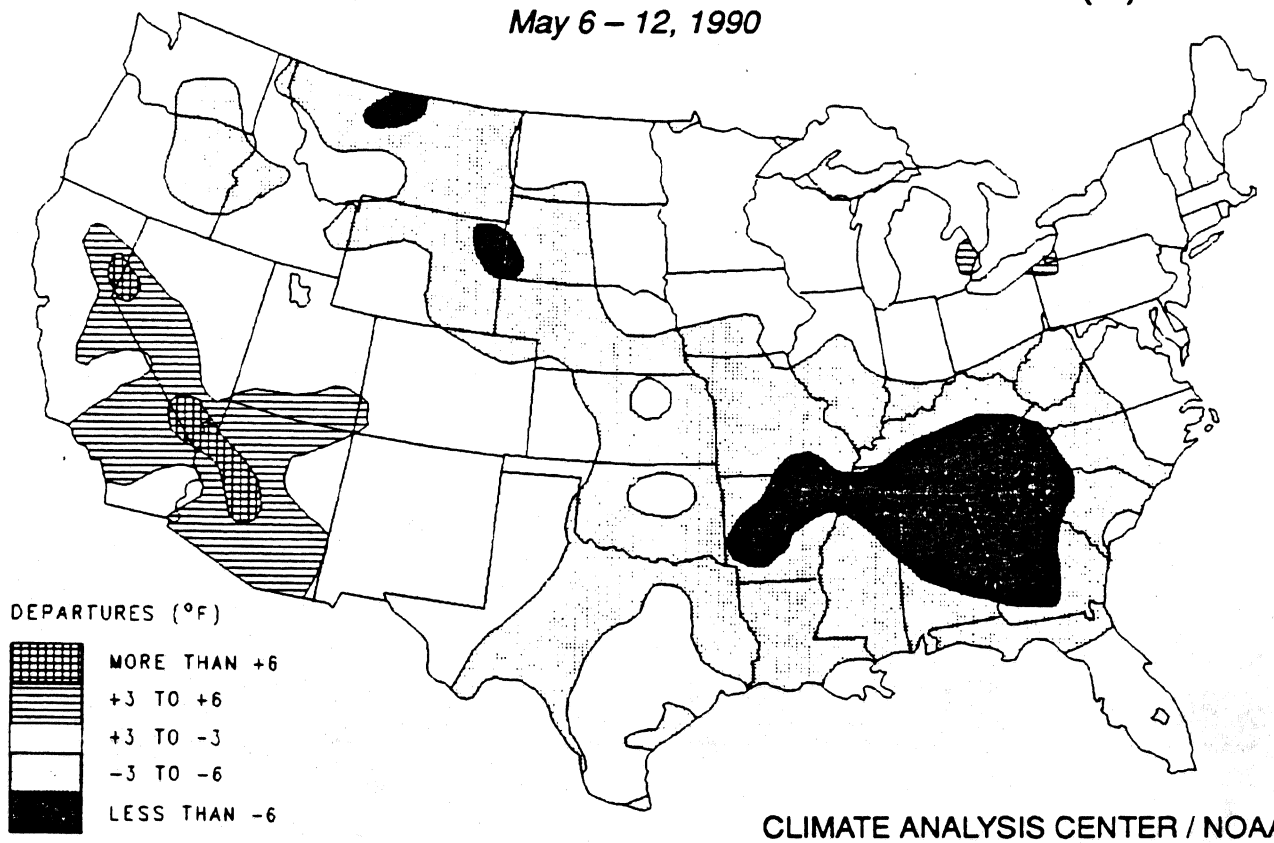
May 6 – 12, 1990



CLIMATE ANALYSIS CENTER / NOAA

DEPARTURE OF AVERAGE TEMPERATURE FROM NORMAL (°F)

May 6 – 12, 1990



CLIMATE ANALYSIS CENTER / NOAA

TABLE 1. Selected stations with 2.50 or more inches of precipitation for the week.

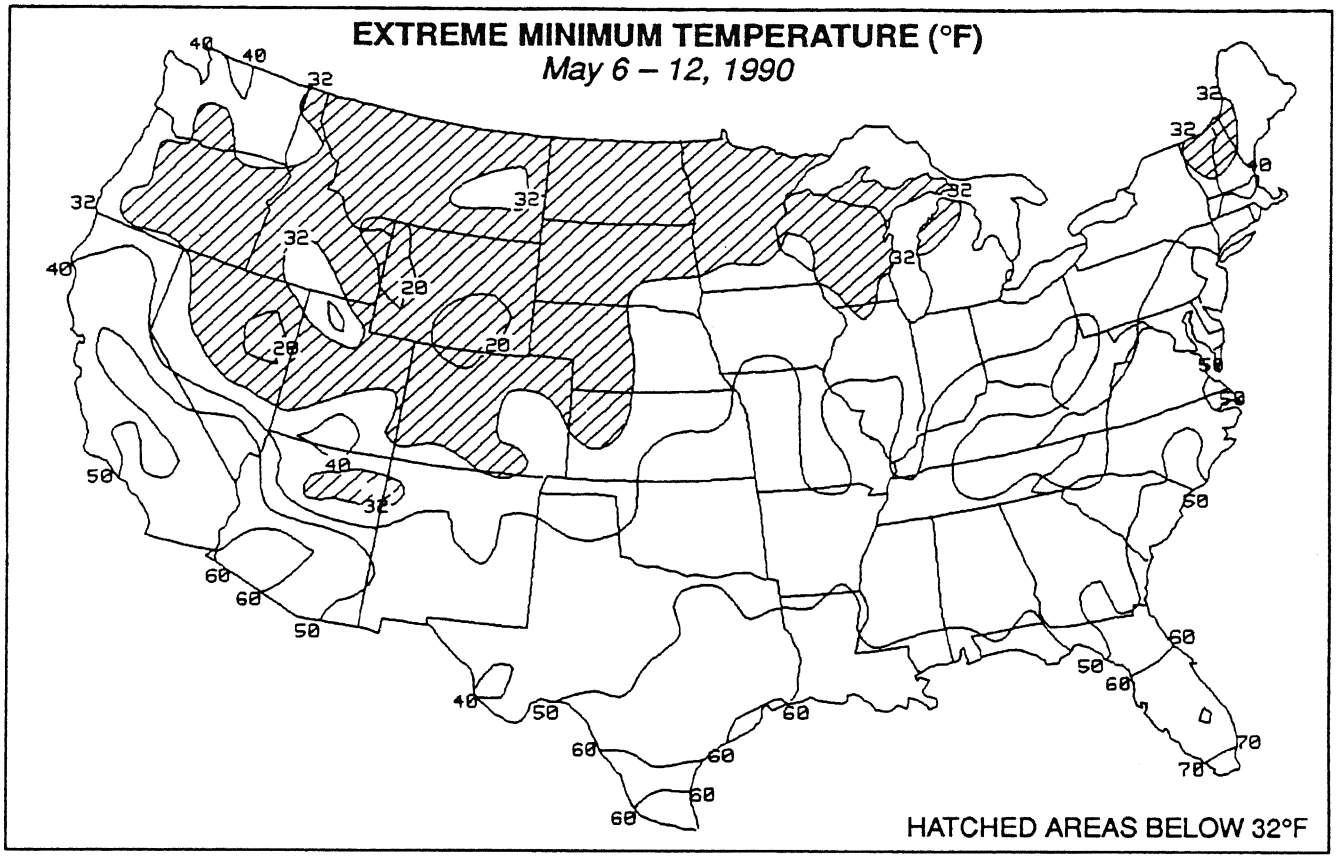
STATION	TOTAL (INCHES)	STATION	TOTAL (INCHES)
VALPARAISO/EGLIN AFB, FL	5.06	MONROE, LA	2.99
WASHINGTON/ANDREWS AFB, MD	4.08	MARQUETTE, MI	2.92
SHREVEPORT, LA	4.04	MERIDIAN, MS	2.92
GLENVIEW NAS, IL	3.82	GWINN/SAWYER AFB, MI	2.83
CHICAGO/O'HARE, IL	3.65	MUSKEGON, MI	2.80
MILWAUKEE, WI	3.51	WACO, TX	2.67
PATUXENT RIVER NAS, MD	3.17	SHREVEPORT/BARKSDALE AFB, LA	2.62
JACKSON, MS	3.08	ISLIP, NY	2.56
LAKE CHARLES, LA	3.02	TUSCALOOSA, AL	2.55

TABLE 2. Selected stations with temperatures averaging 4.5°F or more ABOVE normal for the week.

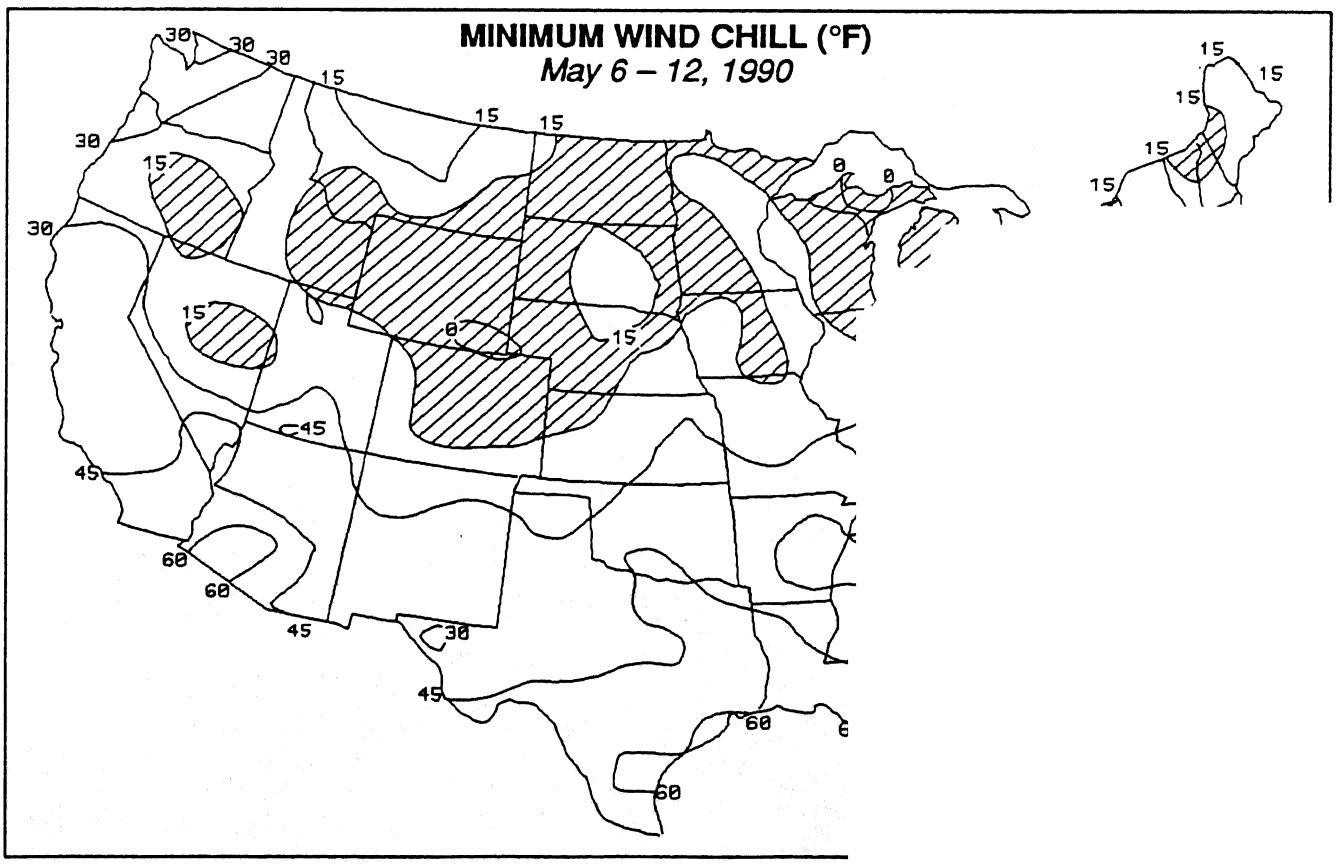
STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
BARTER ISLAND, AK	+10.1	27.1	KODIAK, AK	+5.6	47.1
KOTZEBUE, AK	+9.2	37.5	MCGRATH, AK	+5.6	47.0
PHOENIX, AZ	+7.1	81.9	RENO, NV	+5.5	58.1
FAIRBANKS, AK	+7.0	51.9	PRESCOTT, AZ	+5.4	60.5
BARROW, AK	+6.8	21.7	HOMER, AK	+5.4	46.1
VICTORVILLE/GEORGE AFB, CA	+6.6	69.1	YAKUTAT, AK	+5.3	46.5
SAN BERNADINO/NORTON AFB, CA	+6.1	69.6	NORTHWAY, AK	+4.8	45.6
NOME, AK	+6.0	38.6	KING SALMON, AK	+4.8	44.9
BETTLES, AK	+5.8	46.2	BETHEL, AK	+4.8	41.9
GLENDALE/LUKE AFB, CA	+5.7	79.2	BLUE CANYON, CA	+4.7	54.1
LAS VEGAS, NV	+5.6	76.4	ST. PAUL ISLAND, AK	+4.5	37.9

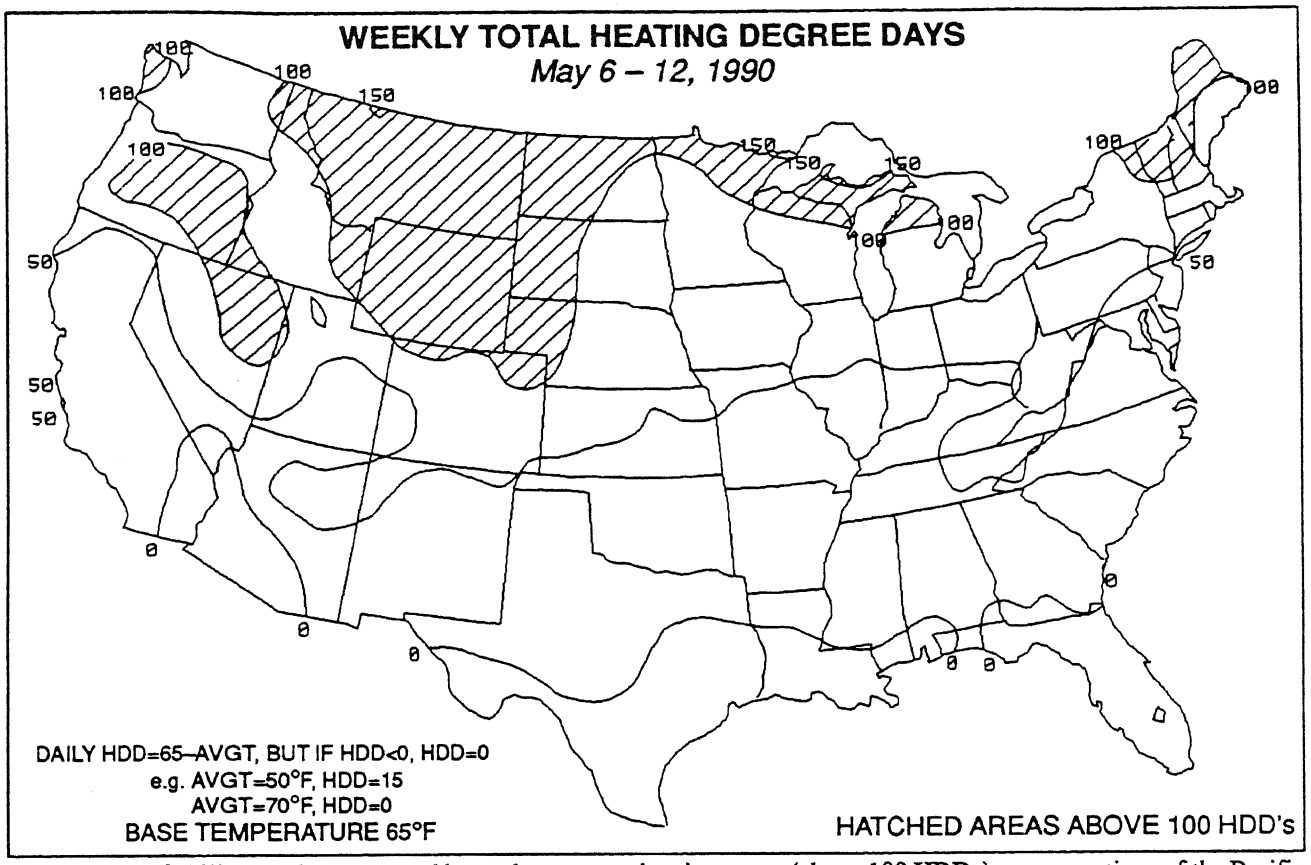
TABLE 3. Selected stations with temperatures averaging 6.0°F or more BELOW normal for the week.

RE	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
	58.3	ATHENS, GA	-6.6	61.1
	59.9	TUSCALOOSA, AL	-6.6	63.2
	60.0	GREAT FALLS, MT	-6.5	44.7
	60.8	NASHVILLE, TN	-6.5	59.9
	61.2	BIRMINGHAM, AL	-6.5	61.9
	54.5	COLUMBUS, GA	-6.4	64.0
	60.1	MONTGOMERY, AL	-6.3	64.4
	64.3	POPLAR BLUFF, MO	-6.2	59.5
	66.4	CHATTANOOGA, TN	-6.2	60.0
	60.9	BRISTOL, TN	-6.0	56.7
	46.1			

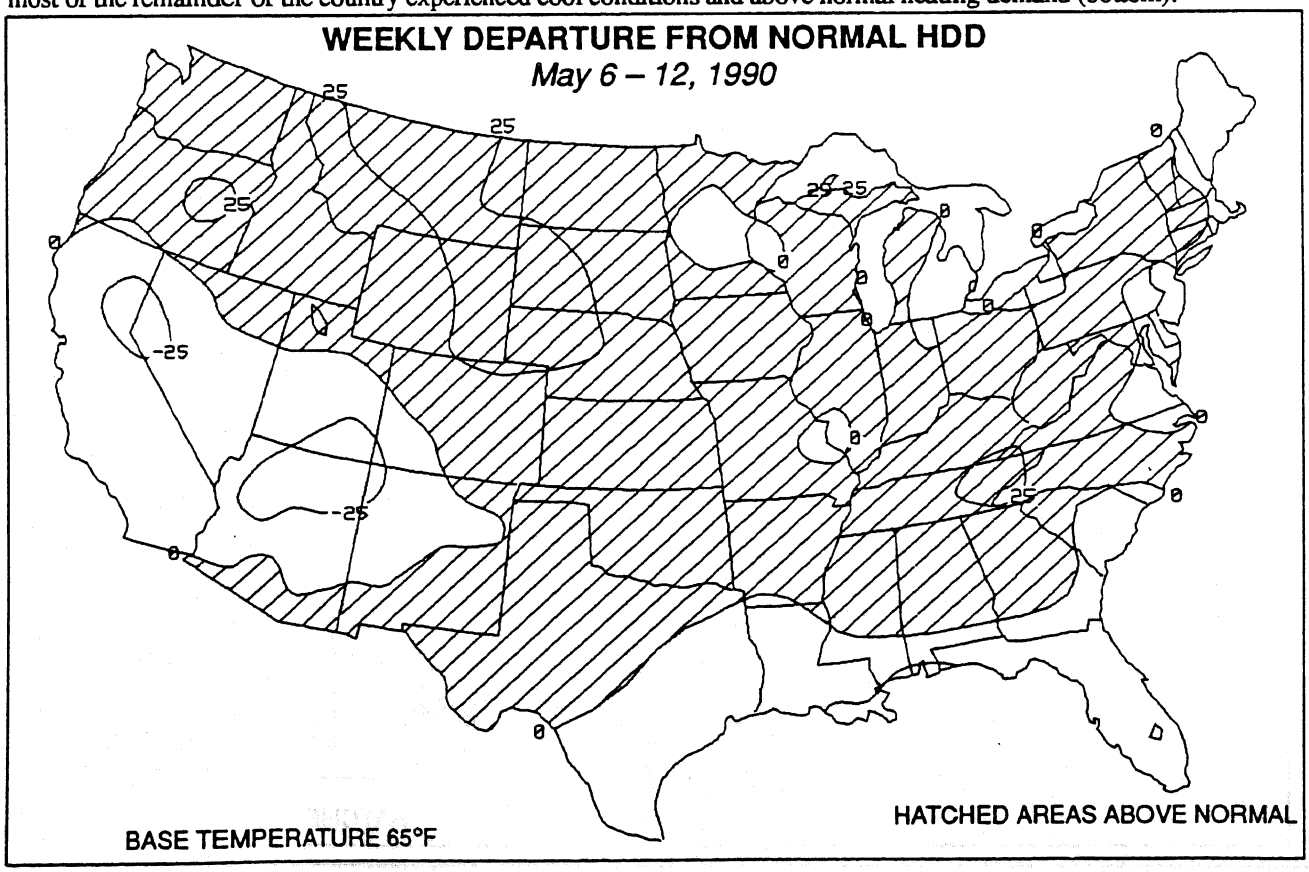


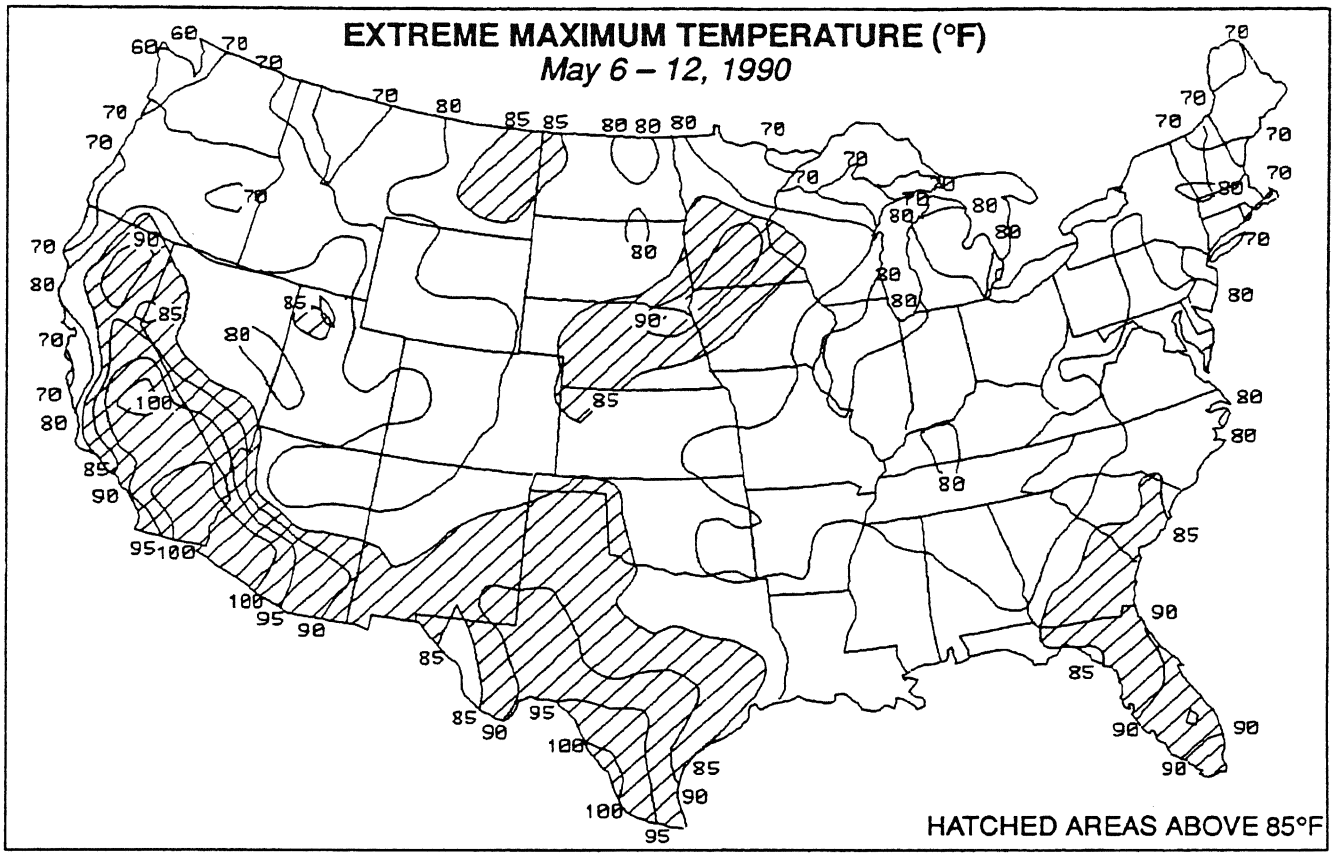
Wintry weather broke out across the northern halves of the Intermountain West, Rockies, and Plains as well as the upper Midwest and northern New England, with subfreezing temperatures recorded as far south as Kansas (top). In addition, gusty winds helped generate very cold (below 15°F) wind chills in many of the same areas (bottom).



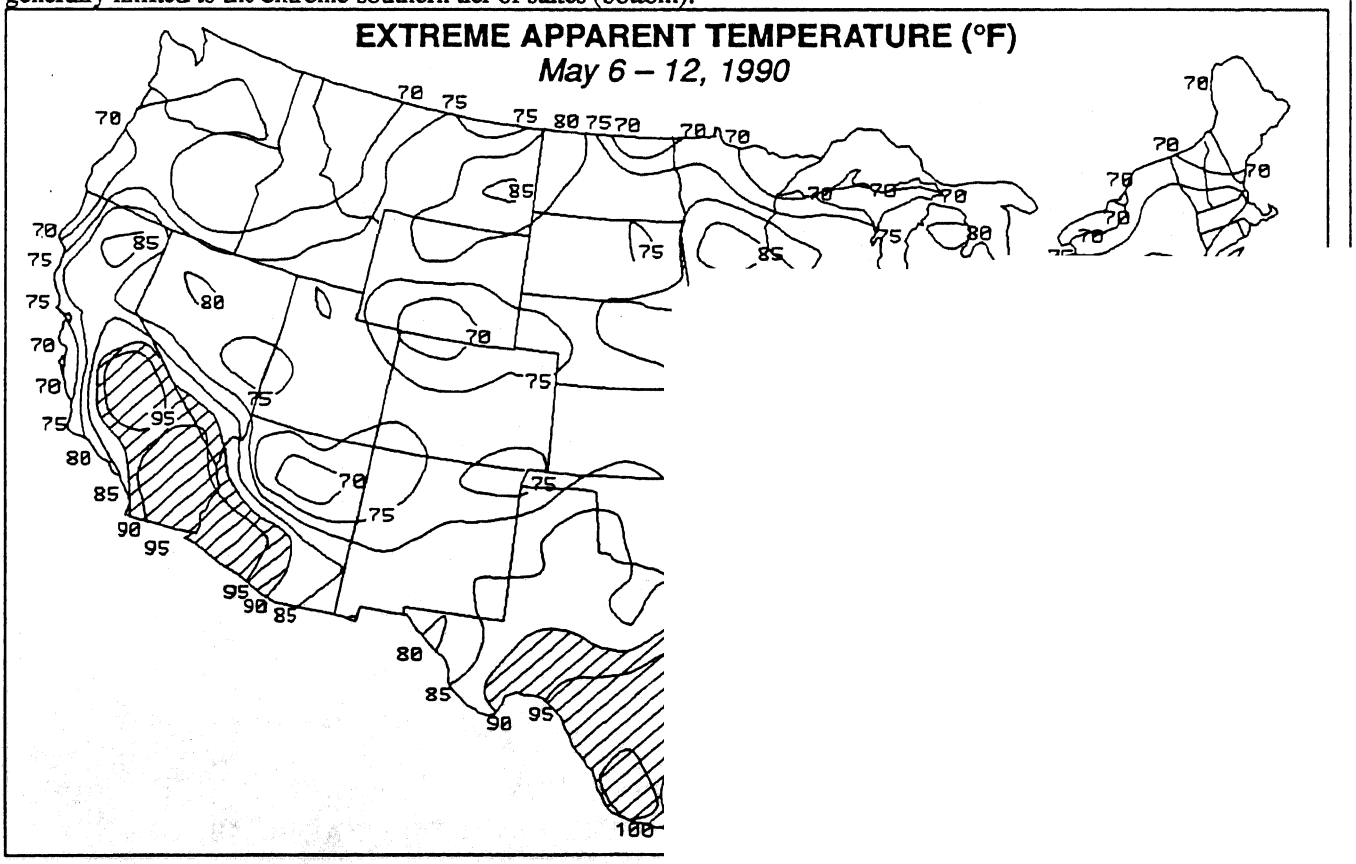


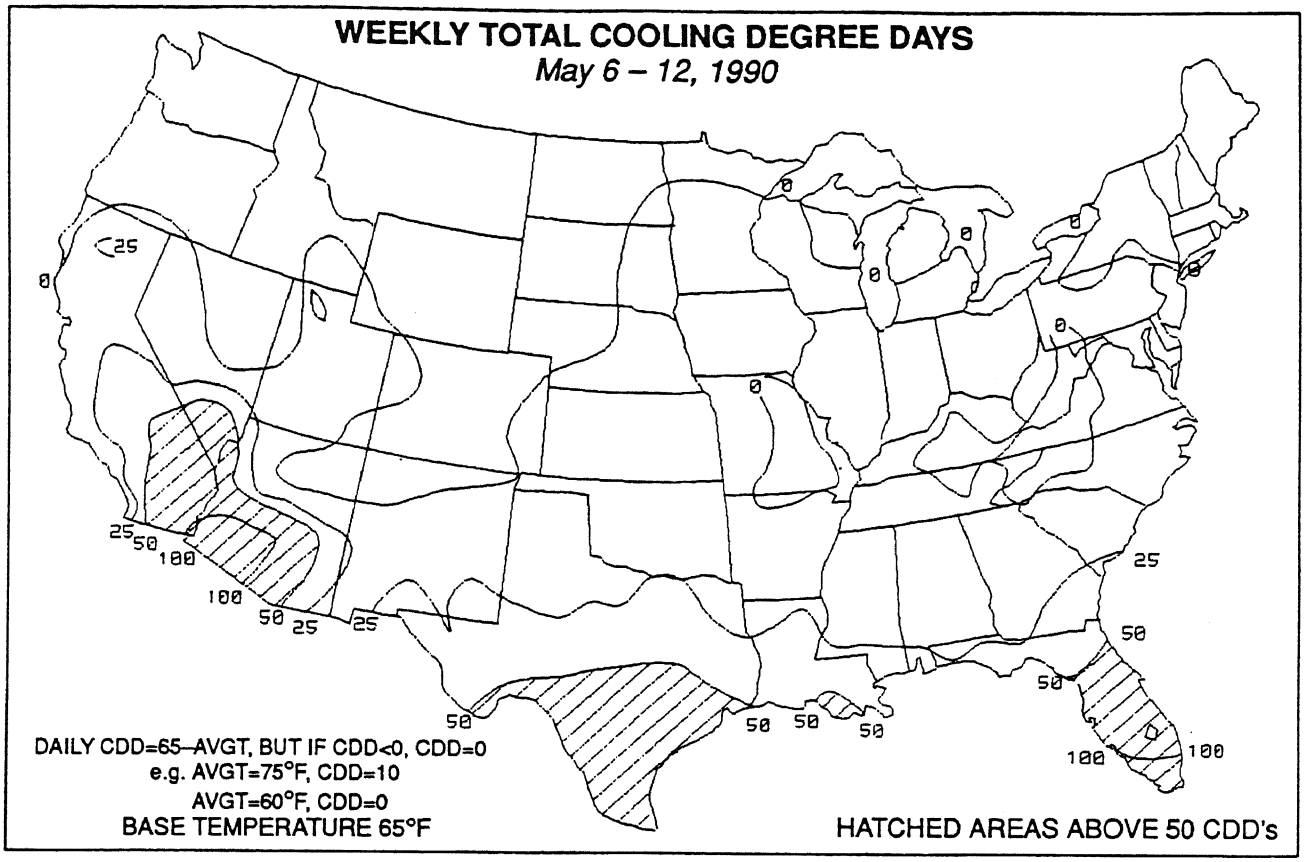
An outbreak of chilly weather generated heavy late–season heating usage (above 100 HDDs) across portions of the Pacific Northwest, Great Basin, the Northern and central Rockies, and along the extreme northern tier of the Great Plains, Great Lakes, and Northeast (top). Meanwhile, warm and dry weather kept heating demand below normal across the Southwest while most of the remainder of the country experienced cool conditions and above normal heating demand (bottom).



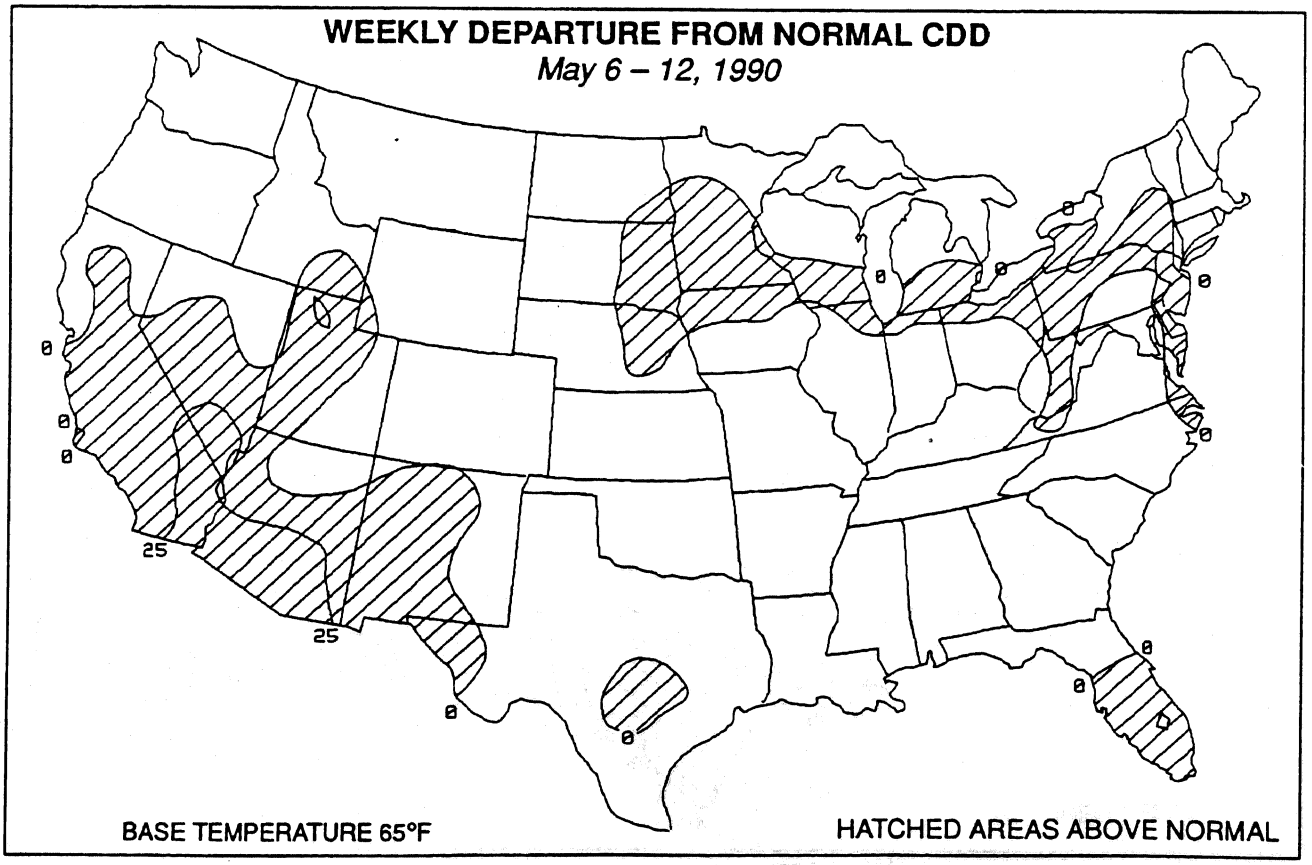


A lack of unusually hot weather kept temperatures in the nineties restricted to Florida, the southern Plains, desert Southwest, and interior California, although a short–lived warm spell drove temperatures into the high eighties in parts of the northern Plains (top). Also, relatively low temperatures and humidity caused few problems as apparent temperatures above 90°F were generally limited to the extreme southern tier of states (bottom).

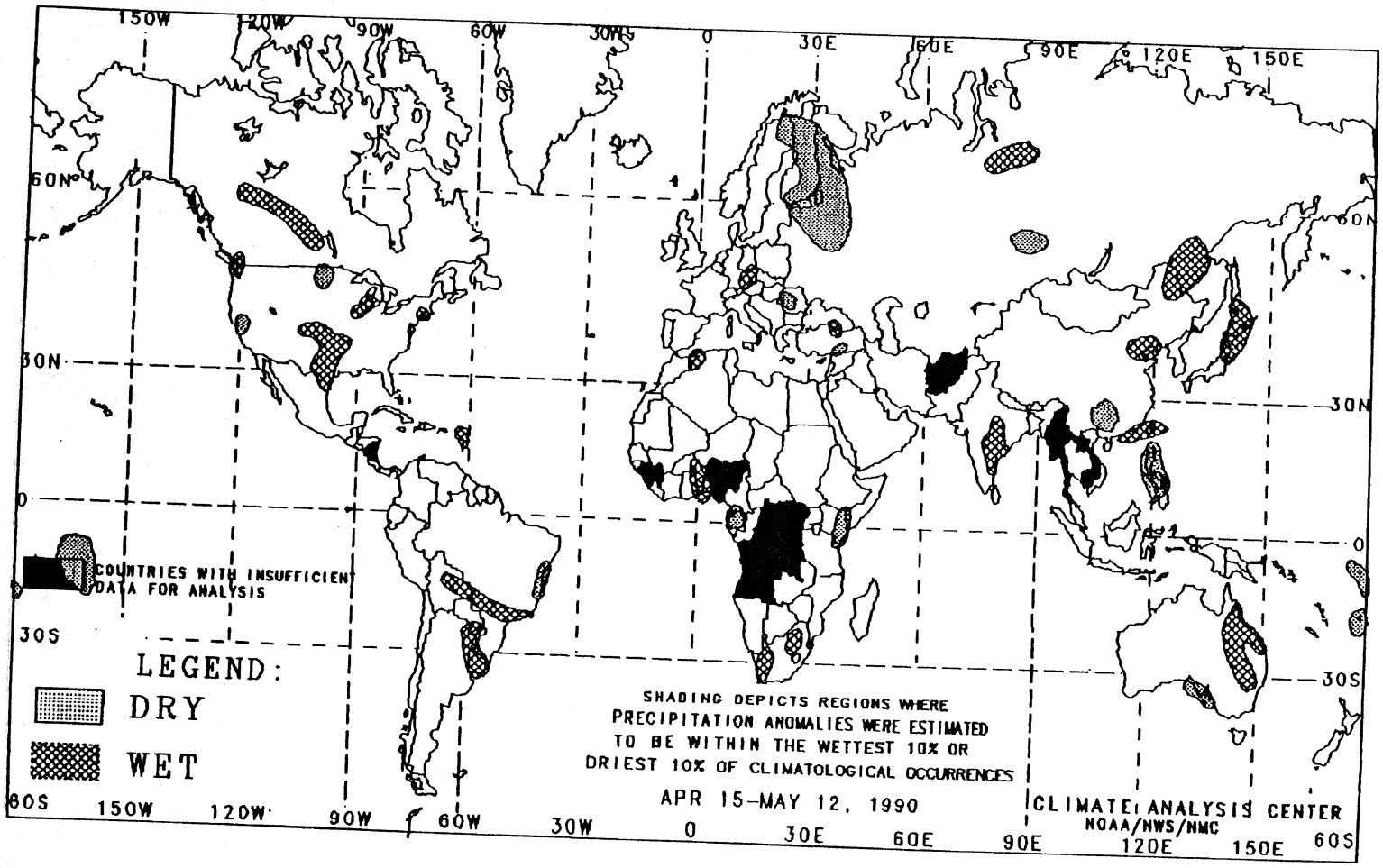




Few hot days were recorded last week, restricting substantial cooling usage to the extreme southern tier of states and desert Southwest (top). Only hot and dry weather in the desert Southwest generated significant above–normal heating demand (bottom).



4 WEEKS



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

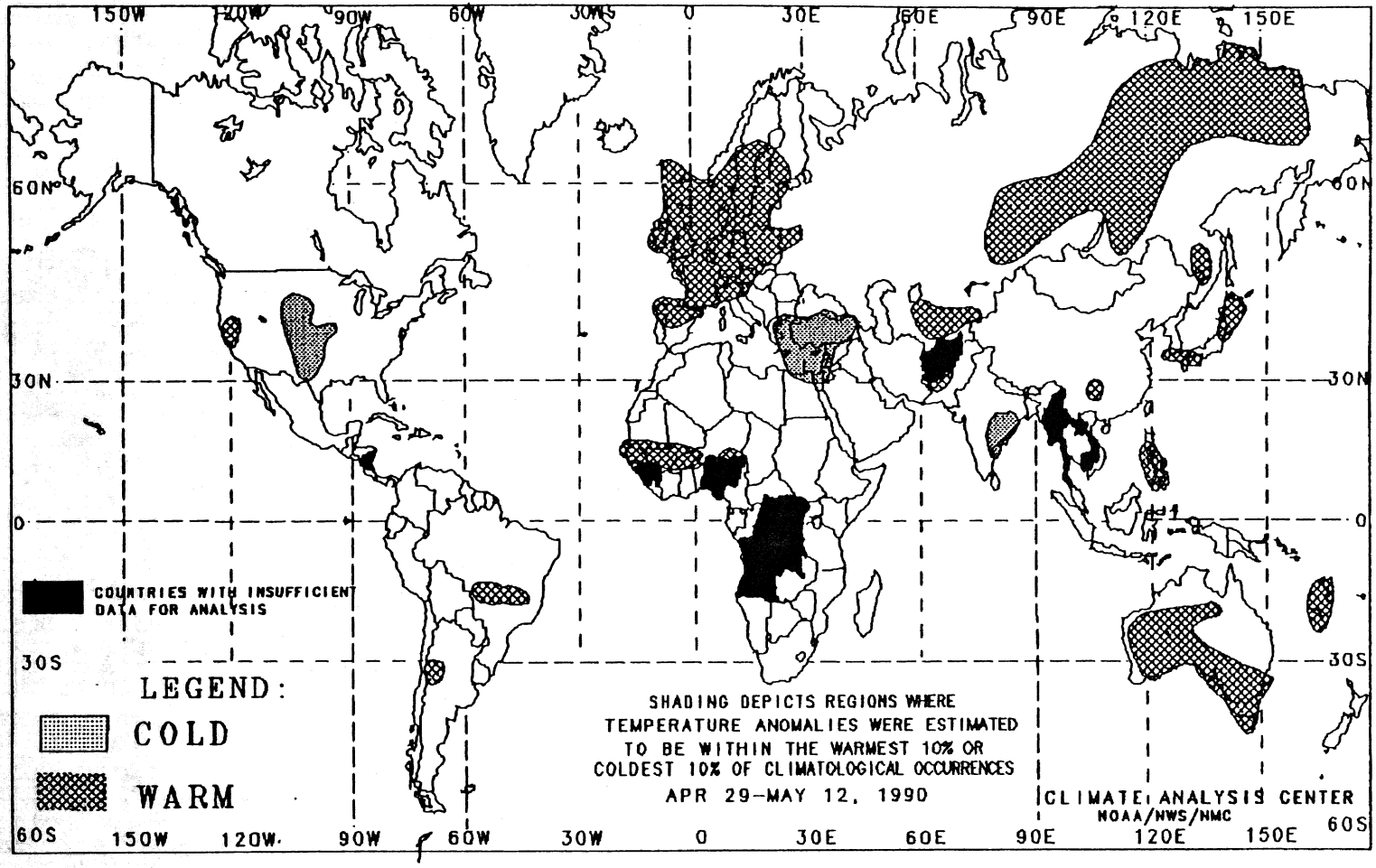
In climatologically arid regions where normal precipitation for the four week period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total four week precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data are insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of four week precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

GLOBAL TEMPERATURE ANOMALIES

2 WEEKS



The anomalies on this chart are based on approximately 2500 observing stations for which at least 13 days of temperature observations were received from synoptic reports. Many stations do not operate on a twenty–four hour basis so many night time observations are not taken. As a result of these missing observations the estimated minimum temperature may have a warm bias. This in turn may have resulted in an overestimation of the extent of some warm anomalies.

Temperature anomalies are not depicted unless the magnitude of temperature departures from normal exceeds 1.5°C.

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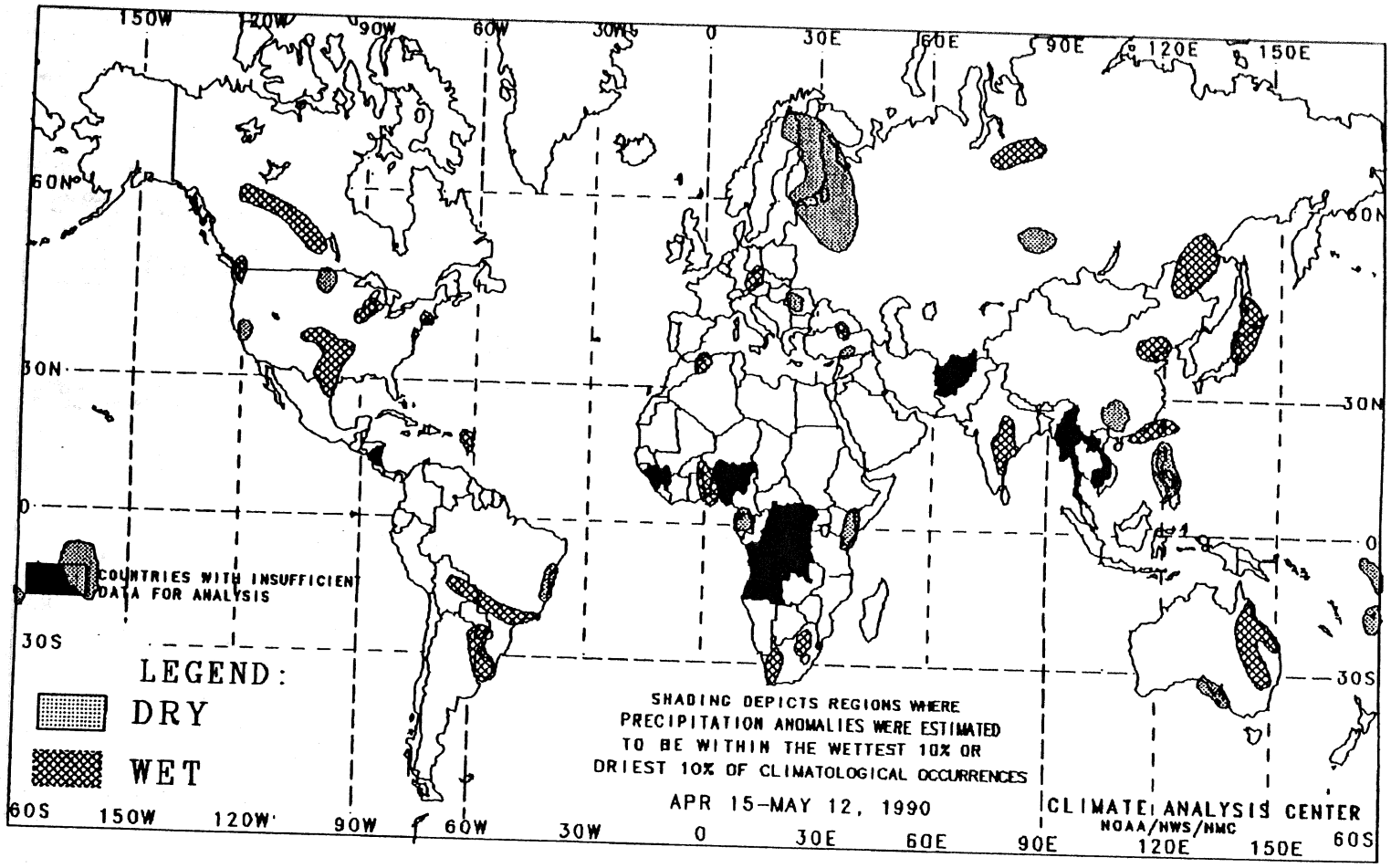
GLOBAL PRECIPITATION ANOMALIES

4 WEEKS



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UNITED STATES MONTHLY CLIMATE HIGHLIGHTS

APRIL 1990

Similar to March, April tends to feature sharp contrasts in weather as winter grudgingly gives way to summer. Summer-like heat may afflict a portion of the country while heavy snows bury areas farther north and west. Between these two extremes, quickly-advancing cold air moves underneath slowly-retreating warm and humid air, generating severe thunderstorms which may batter portions of the nation repeatedly.

April 1990 was a typical April in many aspects, but some of the extremes that occurred last month were unusually harsh. Winter attempted a comeback during the first half of the month across the central and eastern U.S. as snow and sub-freezing temperatures affected portions of the Great Lakes, north-central Plains, and Northeast on several occasions. One storm generated snow as far south as the Ohio Valley and mid-Atlantic, dropping up to four inches of snow on portions of northern Virginia and southern New Jersey while higher elevations in West Virginia were buried under 10 inches.

Chilly air repeatedly pushed into the central and eastern U.S. while areas west of the High Plains remained warm and dry. Storm systems formed along the leading edge of the chilly blasts (usually in the southern High Plains), enhancing precipitation totals as the cold fronts worked their way across the eastern half of the nation. Warm, tropical air was periodically pulled into much of the Plains, Midwest, and East Coast for brief periods before being displaced by the cooler air behind the front. Portions of the south-central Plains from northeastern Texas to western Arkansas were hit hardest by these frontal thunderstorms, which were frequently accompanied by inundating downpours, large hail, hurricane-force wind gusts, and large hail. By the month's end, as much as 15 inches of rain were measured across this area, with unofficial reports of up to 17.5 inches falling on isolated Texas locations within 24 hours. The intense precipitation produced widespread urban and river flooding throughout the region late in the month, forcing thousands of individuals from their homes and taking several lives. Rivers had not yet crested as the month ended. Severe weather continued at a near-record pace, allowing the first third of 1990 to record more tornadoes than any other January-April period except that of 1974, according to the National Climatic Data Center (NCDC) (Figure 14).

In sharp contrast, warm and dry weather dominated the Far West throughout the month, particularly in California, exacerbating conditions caused by a fourth consecutive drier-than-normal rainy season. October 1989-April 1990 became the second driest rainy season for the West region since records began in 1895. Long-term trends, produced by using a 9-point binomial filter that smooths out sharp annual fluctuations, have dropped to unprecedentedly and ominously low levels (Figure 9). Fortunately, the frequent thunderstorm activity across the eastern half of the nation brought above normal rainfall to southern Texas and southeastern Florida, providing some relief from long-term dryness. In the latter region, April 1990 broke a string of 19 consecutive months with below-normal Palmer Z index values (Figure 13).

According to the River Forecast Centers, 10 to 15 inches of rain deluged much of an area from north-central Texas northeastward across southeastern Oklahoma into western Arkansas, generating widespread flooding which showed no signs of relenting as the month ended (Table 1). Surrounding this afflicted region, heavy precipitation (between 4 and 10 inches) drenched much of the south-central Great Plains and lower Mississippi Valley. Moderate to heavy precipitation (between 3 and 7 inches) fell on scattered parts of the nation, including most of the Northeast and mid-Atlantic, the Deep South, the central and western Gulf Coast, southeastern Florida, the upper and middle Mississippi Valley, the central Rockies, and across isolated locations in the Ohio Valley, Florida, northern Intermountain West, and Pacific Northwest. These totals represented more than twice the normal April precipitation across much of the southern Plains, southeastern Florida, and portions of the Hard Red Winter Wheat Belt, in portions of the upper Mississippi Valley, and across the south-central Rockies (Figures 1 and 2). In addition, much of the southern Rockies and Great Basin measured between 2 and 4 times the normal precipitation, which relates to only 1 to 2 inches in these normally dry locations. Similarly, between 0.5 and 2 inches of precipitation was above normal for the month across the northern Intermountain West and portions of the northern Rockies. On a long-term basis, widespread excessive wetness has been a diminishing problem since late Summer 1989 as the areal coverage of severe and extreme wetness has been approximately halved (Figure 8). Regionally, however, severe localized problems, such as the extensive flooding in portions of the south-central Plains, have continued plaguing various areas across the nation. More than one-fifth of the Arkansas-Red-White and lower Mississippi Basins are currently experiencing severely or extremely wet conditions (page 24), while eight states recorded one of their ten wettest January-April periods since records began in 1895 (page 18). Unlike April 1986 and 1988, the two driest Aprils ever, April 1990 did not bring any regional or national extremes (pages 12 and 13). April 1990 national precipitation was slightly below normal, ranking as the 45th driest April during the last 96 years.

Although most of the nation's attention was focused on excessive precipitation during April 1990, subnormal rainfall created concern in several areas, particularly along the southern Atlantic Coast, in western Florida, through portions of the Corn Belt and upper Great Lakes, in parts of the central and northern Great Plains, and throughout much of the Far West and Hawaii. These areas recorded a very dry April, measuring less than half the normal monthly precipitation (Table 2, Figures 1 and 2). Little or no rain fell on areas west of the Rockies, and the normally wetter regions east of the northern and central High Plains observed between 0.5 and 2 inches of precipitation.The lack of April precipitation severely affected North Dakota, where fifteen consecutive dry months (based upon the Palmer Z Index) have been observed (Figure 12). Subnormal precipitation across the Primary Corn and Soybean Belt during the first two months of the growing season (March-April) was observed for the sixth consecutive year, although shortages during the last two years have not been as severe as those observed during 1987 and 1988 (Figure 10). Across the Primary Hard Red Winter Wheat Belt, however, heavy precipitation during January-April 1990 compensated for exceptionally dry weather during October-December 1989. As a result, the October 1989-April 1990 Hard Red Winter Wheat growing season recorded near normal precipitation (Figure 11).Nationally, severe and extreme drought, as categorized by the Palmer Drought Index, covered approximately one-quarter of the country (Figure 8). Several river basins have been adversely affected as more than four-fifths of the California, Lower Colorado, and Upper Colorado Basins experienced severe or extreme drought (page 24). During the first third of 1990, both the northeasternmost and southwesternmost of the contiguous 48 states (Maine and California) have recorded one of the twenty-five driest such periods since 1895 (page 12). April 1990 did not bring any exceptionally low regional precipitation rankings, although the Central and Southeast observed their 21st and 22nd driest April, respectively (page 12).

This year's unseasonable warmth across the country continued into April, but at a diminished level compared to January-March 1990. Through the first four months of 1990, record or near-record warmth existed on a state-wide (page 18), regional (Figures 6 and 7), and national (Figure 5) basis. April's temperatures averaged above normal, especially in the Far West, but slightly colder than usual conditions in the central and southeastern U.S. diminished April's overall warmth. Nationally, this April ranked as the twenty-third warmest April on record thanks to the fifth, seventh, and ninth warmest April in the West, Northwest, and Southwest regions, respectively. Throughout most of these regions, monthly temperatures averaged more than 4°F above normal, or in the upper 10% of climatological occurrences (Figures 3 and 4). Unseasonably mild weather was also reported across Alaska as many locations observed departures exceeding +6°F (Tables 3 and 6).

For the first time since December, monthly temperatures averaged below normal across a large section of the country east of the Mississippi River. Unseasonably cold weather dominated the central and eastern U.S. the first two weeks of April, but a summer-like heat wave during the last week of the month throughout the eastern half of the nation (Table 7) elevated the area's monthly temperatures close to normal. Departures less than -2°F occurred in the Tennessee and lower Missouri and Ohio Valleys, the southern Great Plains, and along parts of the central and eastern Gulf Coast (Figures 3 and 4, Table 4).

TEMPERATURE AND PRECIPITATION RANKINGS FOR APRIL 1990, BASED ON THE PERIOD 1895–1990. 1 = DRIEST/COLDEST, 96 = WETTEST/HOTTEST.

REGION	*PRECIPITATION*	*TEMPERATURE*
NORTHEAST	65	75
EAST NORTH CENTRAL	44	66
CENTRAL	21	38
SOUTHEAST	22	42
WEST NORTH CENTRAL	38	65
SOUTH	63	47
SOUTHWEST	47	88
NORTHWEST	62	90
WEST	39	92
NATIONAL	45	74

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PRECIPITATION RANKINGS FOR JAN – APR 1990, BASED ON THE PERIOD 1895 – 1990 (96 YEARS) WHERE 1 = DRIEST AND 96 = WETTEST.

STATE	*RANK*	*STATE*	*RANK*	*STATE*	*RANK*	*STATE*	*RANK*
AL	92	IA	71	NE	40	RI	65
AZ	30	KS	78	NV	56	SC	31
AR	91	KY	56	NH	45	SD	44
CA	16	LA	91	NJ	45	TN	57
CO	45	ME	25	NM	66	TX	88
CT	71	MD	49	NY	89	UT	50
DE	40	MA	35	NC	61	VT	75
FL	36	MI	46	ND	28	VA	50
GA	51	MN	82	OH	48	WA	85
ID	66	MS	89	OK	96	WV	32
IL	65	MO	90	OR	45	WI	56
IN	33	MT	41	PA	35	WY	33

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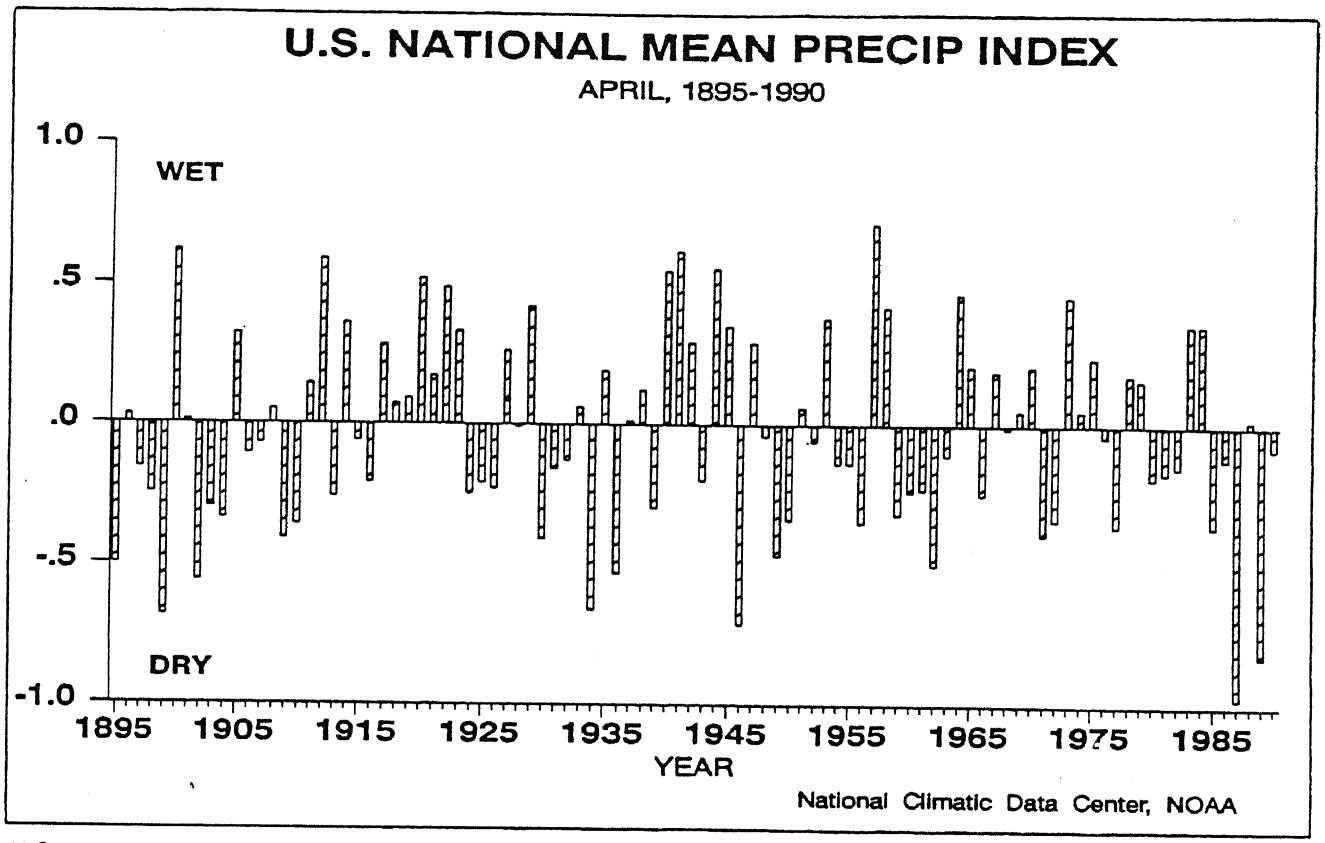
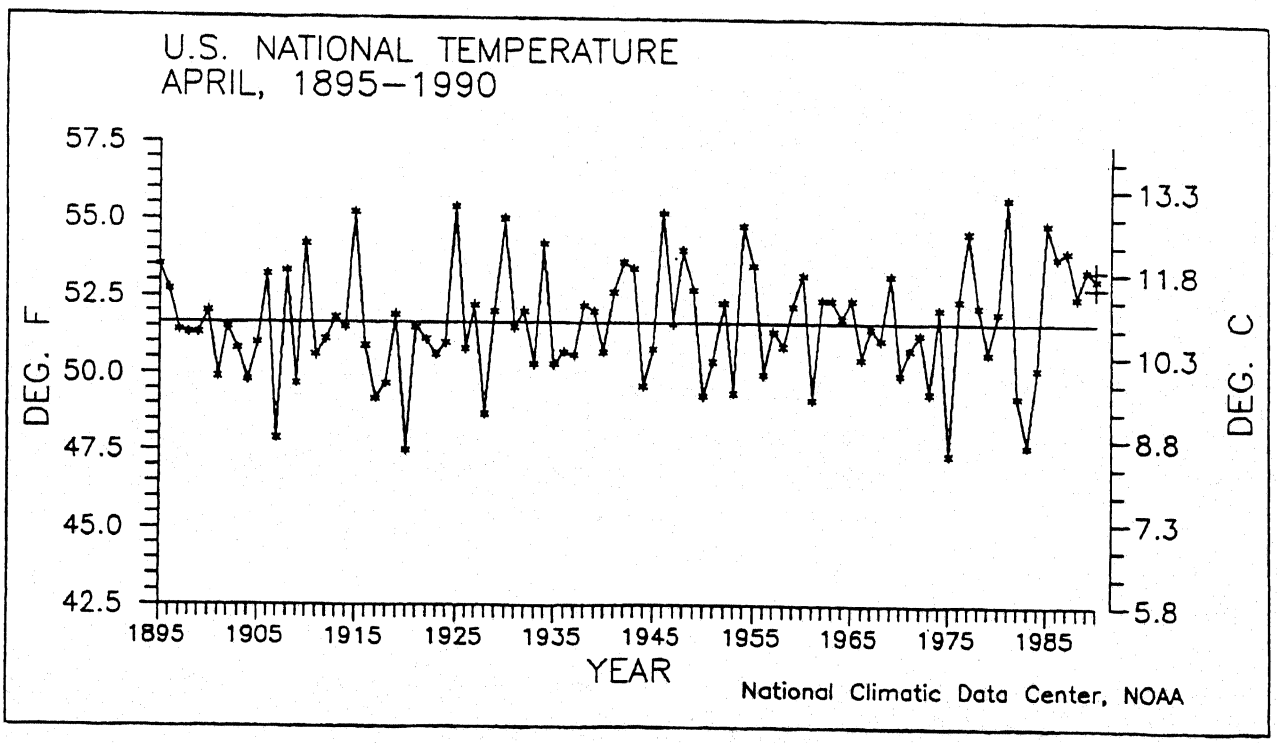


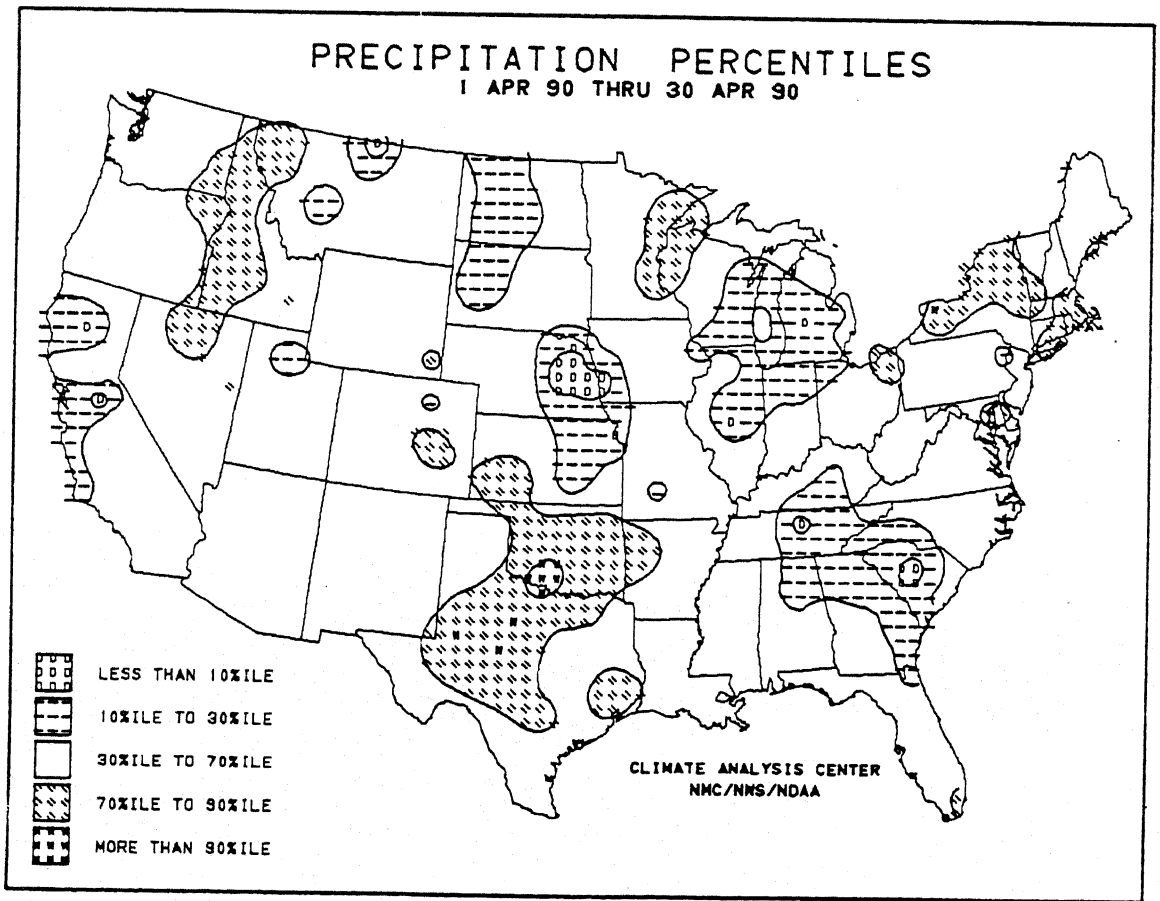
U.S. National April 1990 mean precipitation index (top) and temperature (bottom). The monthly precipitation for each climate division in the country (total of 344) was first standardized over the 1951-1980 period, then weighed by area and averaged to determine a national standardized precipitation value. Negative (positive) values are dry (wet). Based upon the index, the April 1990 precipitation was slightly below the long-term mean (the 45th driest April during the past 96 years). On a local basis, however, the precipitation was unevenly distributed as ample monthly precipitation soaked the southern Plains and much of the Rockies while relatively dry conditions affected much of the West, the central Plains, the Midwest, the Southeast, and along the eastern Gulf and the southern Atlantic Coasts. April 1990 temperatures across the contiguous U.S. averaged above the long-term mean, ranking as the 23rd mildest April on record (since 1895). Combined with the warmest January, the fifteenth warmest February, and the tenth warmest March on record, 1990 has recorded the second warmest start to a year (Jan.-Apr.) in the lower 48 states during the past 96 years, according to the NCDC (1986 is ranked first).



ABLE 1. SELECTED STATIONS WITH MORE THAN 150% OF NORMAL PRECIPITATION ND MORE THAN 4 INCHES OF PRECIPITATION; OR, STATIONS WITH MORE THAN 7 CHES OF PRECIPITATION AND NO NORMALS DURING APRIL 1990.

ATION	TOTAL (INCHES)	PCT. OF NORMAL	STATION	TOTAL (INCHES)	PCT. OF NORMAL
CALESTER, OK	10.28	226.4	HOUSTON, TX	6.21	166.0
TTLE ROCK AFB, AR	9.30	***	BOSTON/LOGAN, MA	5.94	160.5
RT SMITH, AR	8.48	202.9	BUFFALO, NY	5.22	171.7
LLAS NAS, TX	7.79	***	AKRON, OH	5.12	158.0
MESTEAD AFB, FL	7.61	***	OKLAHOMA CITY, OK	5.11	177.4
YETTEVILLE, AR	7.44	162.4	WASHINGTON/DULLES AIRPORT, VA	5.06	184.0
YTHEVILLE AFB, AR	7.08	163.1	FT. SILL/HENRY POST AAF, OK	5.01	171.6
AMI, FL	6.96	214.8	DEL RIO, TX	4.82	260.5
CHITA FALLS, TX	6.95	234.8	ABILENE, TX	4.57	194.5
LLAS-FORT WORTH, TX	6.90	168.7	MASSENA, NY	4.53	169.7
LACIOS, TX	6.89	267.1	SAN ANTONIO, TX	4.52	166.8
OIAK, AK	6.63	182.1	HOBART, OK	4.47	199.6
LLEGE STATION, TX	6.59	151.8	MONTPELIER, VT	4.34	167.6
CHESTER, MN	6.47	255.7	SAN ANGELO, TX	4.12	238.1

(Note: Stations without precipitation normals are indicated by asterisks.)



e 1. April 1990 precipitation percentiles. Substantial April precipitation (>70%ile) soaked the southern t Plains, central New England, the upper Midwest, and the northern Rockies while significant dryness %ile) affected the central and northern Great Plains, much of the Southeast and the lower Midwest, along coastal California. Overall, April 1990 precipitation across the lower 48 states was slightly the long-term mean (45th driest April since 1895).

TABLE 2. SELECTED STATIONS WITH LESS THAN 50% OF NORMAL PRECIPITATION AND NORMAL PRECIPITATION 3.00 INCHES OR MORE DURING APRIL 1990.

STATION	TOTAL (INCHES)	PCT. OF NORMAL	NORMAL (INCHES)	STATION	TOTAL (INCHES)	PCT. OF NORMAL	NORMAL (INCHES)
LAFAYETTE, IN	0.41	10.9	3.77	NASHVILLE, TN	1.60	36.0	4.45
GOLDSBORO/JOHNSON, NC	0.82	22.1	3.71	BURLINGTON, IA	1.66	47.0	3.53
TOPEKA, KS	1.01	32.8	3.08	BOWLING GREEN, KY	1.71	40.9	4.18
AUGUSTA, GA	1.07	32.4	3.30	CHICAGO/O'HARE, IL	1.79	46.5	3.85
SUMTER/SHAW AFB, SC	1.11	32.8	3.38	MONROE, LA	1.90	38.4	4.95
BLUE CANYON, CA	1.18	21.6	5.45	VALPARAISO/EGLIN AFB,FL	2.05	38.6	5.31
COLUMBIA, SC	1.26	35.1	3.59	ANNISTON, AL	2.07	38.7	5.35
SPRINGFIELD, IL	1.28	32.3	3.96	ADAK, AK	2.10	46.3	4.54
JACKSONVILLE, FL	1.34	44.7	3.00	MONTGOMERY/MAXWELL,AL	2.35	45.2	5.20
ANDERSON, SC	1.39	35.3	3.94	BATON ROUGE, LA	2.71	48.5	5.59
ALTOONA, PA	1.48	41.7	3.55	HILO/LYMAN, HAWAII, HI	3.90	29.8	13.08
CHANUTE, KS	1.52	43.1	3.53	ANNETTE ISLAND, AK	4.19	47.6	8.81
SITKA, AK	1.55	26.2	5.91				

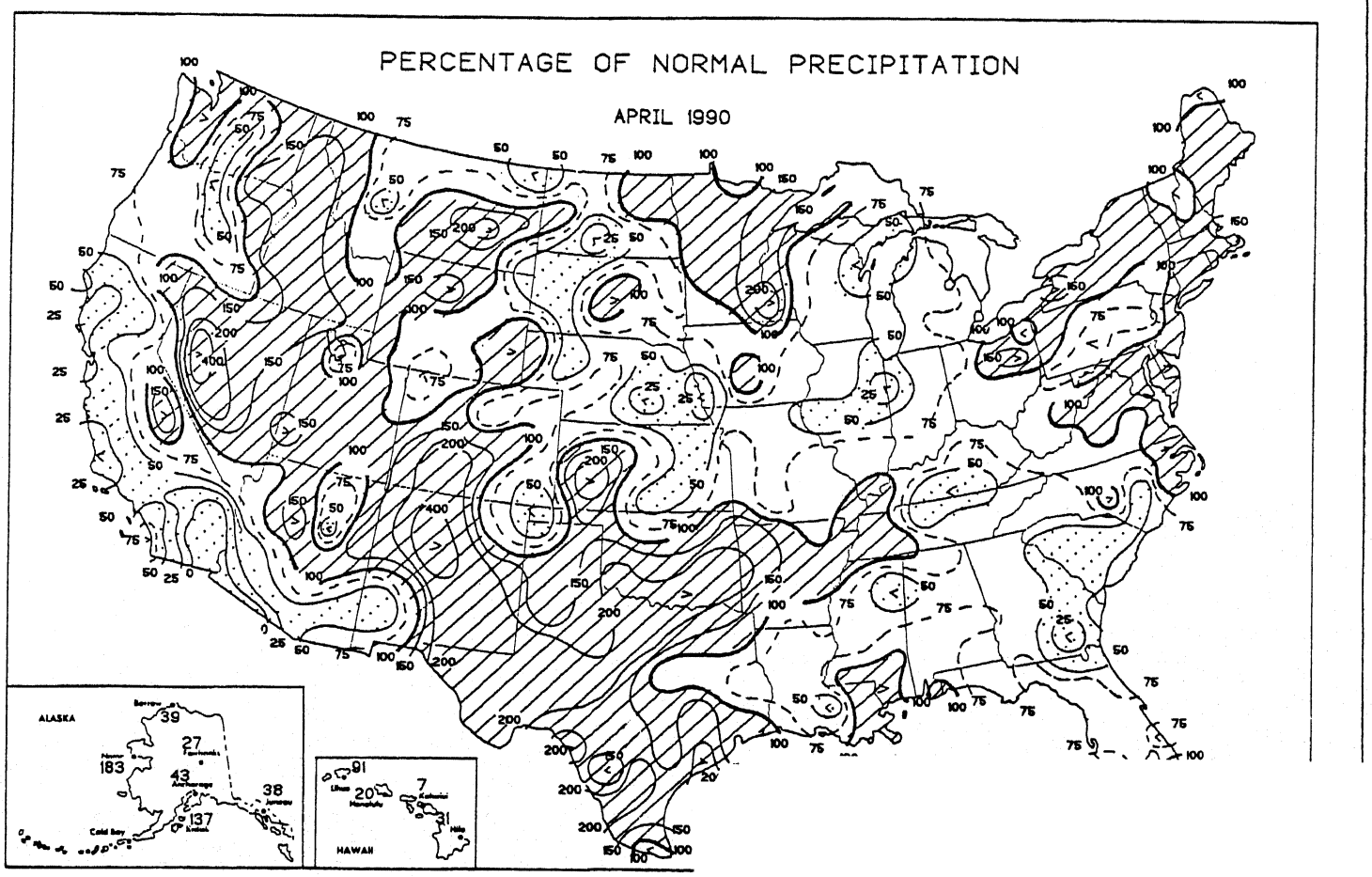


Figure 2. April 1990 percent of normal precipitation. Dott are above normal. Surplus April precipitation fell acros Midwest, most of New England, and extreme southeast the northern and central Great Plains, the central Gre Southeast, and the southern Atlantic Coast states rece region for the third consecutive month.

TABLE 3. APRIL 1990 AVERAGE TEMPERATURES 6.0°F OR MORE ABOVE NORMAL.

STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
BARTER ISLAND, AK	+15.4	14.8	MEDFORD, OR	+7.2	57.6
BETHEL, AK	+9.9	33.6	BETTLES, AK	+7.2	29.6
MCGRATH, AK	+9.6	36.8	BIG DELTA, AK	+7.0	37.9
BARROW, AK	+9.0	7.5	ELKO, NV	+6.9	50.2
PHOENIX, AZ	+8.3	76.3	RED BLUFF, GA	+6.8	65.6
RENO, NV	+8.1	54.5	LEWISTON, ID	+6.8	57.0
KING SALMON, AK	+8.1	39.3	BURNS, OR	+6.8	50.0
NOME, AK	+8.1	26.1	GLENDALE/LUKE AFB, AZ	+6.7	74.1
BURLEY, ID	+7.7	53.4	LOVELOCK, NV	+6.6	55.0
REDMOND, OR	+7.7	51.2	SEXTON SUMMIT, OR	+6.6	48.7
FAIRBANKS, AK	+7.7	38.1	TONOPAH, NV	+6.5	54.0
OMAK, WA	+7.6	55.9	IDAHO FALLS, ID	+6.4	49.6
WINNEMUCCA, NV	+7.4	52.7	VICTORVILLE/GEORGE AFB, CA	+6.1	63.8
BLUE CANYON, CA	+7.4	50.8	BOISE, ID	+6.1	54.7

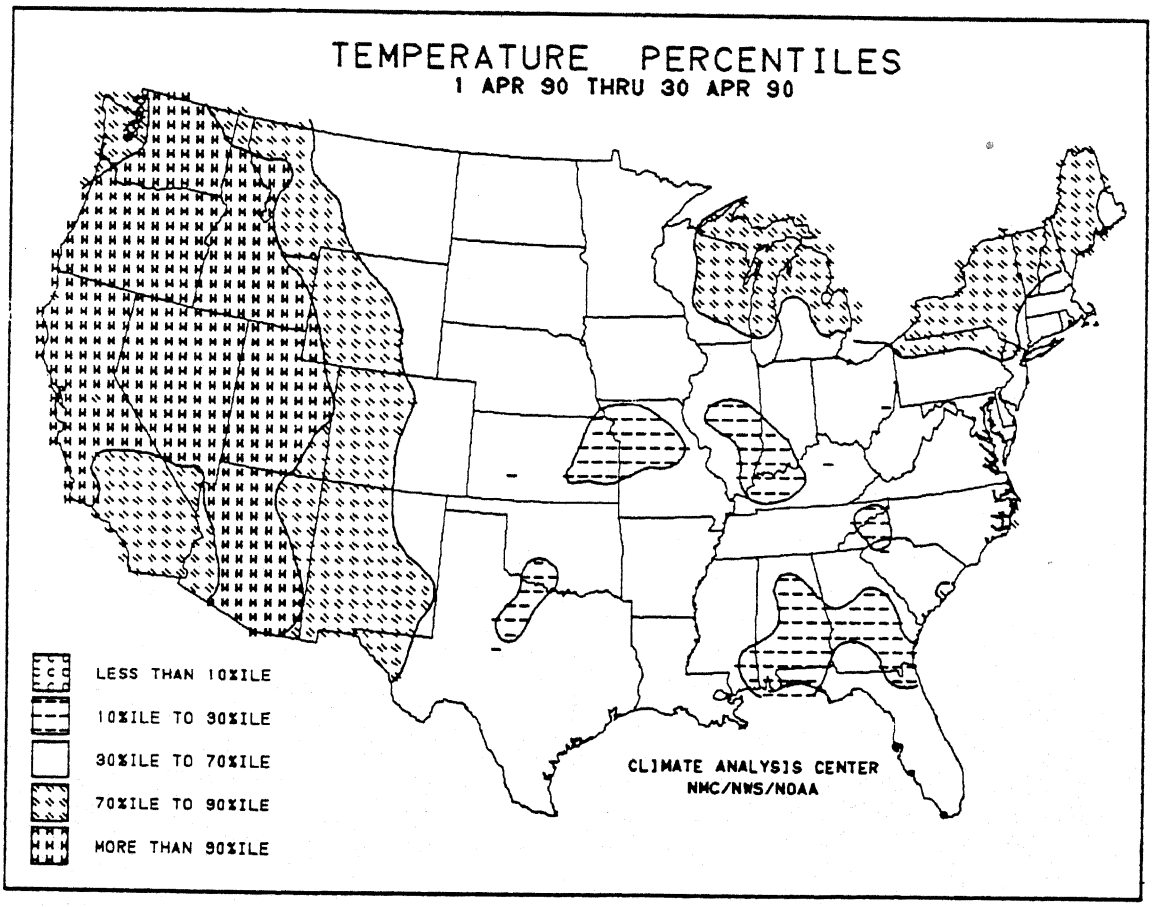


Figure 3. April 1990 temperature percentiles. Significant April warmth (>70%ile) covered the central and eastern Great Lakes, western New England, and the western third of the nation, particularly west of the Continental Divide, where percentiles were in the upper 10%. Slightly colder than normal conditions occurred in the central and southeastern U.S. as average April temperatures in a few areas were in the lower 30% of climatological occurrences.

TABLE 4. APRIL 1990 AVERAGE TEMPERATURES 2.0°F OR MORE BELOW NORMAL.

STATION	DEPARTURE (°F)	AVERAGE (°F)	STATION	DEPARTURE (°F)	AVERAGE (°F)
GAINESVILLE, FL	-3.5	66.1	MUSCLE SHOALS, AL	-2.3	59.2
KANSAS CITY/INTL., MO	-3.2	52.7	MACON, GA	-2.3	63.0
SPRINGFIELD, IL	-3.1	50.7	MONTGOMERY, AL	-2.3	63.0
MOBILE, AL	-3.1	64.9	BRUNSWICK, GA	-2.3	64.8
BILOXI/KEESLER AFB, MS	-2.8	64.8	DODGE CITY, KS	-2.2	52.2
TOPEKA, KS	-2.7	52.0	PADUCAH, KY	-2.2	55.9
EVANSVILLE, IN	-2.7	53.8	HOBART, OK	-2.2	58.1
POPLAR BLUFF, MO	-2.7	56.6	WICHITA FALLS, TX	-2.2	61.5
CHANUTE, KS	-2.6	54.2	JACKSONVILLE, FL	-2.2	66.7
FT. SILL/HENRY POST AAF, OK	-2.5	59.6	DEL RIO, TX	-2.2	69.6
ABILENE, TX	-2.5	62.8	CROSSVILLE, GA	-2.0	53.4
COLUMBIA, MO	-2.3	53.1	MACON/WARNER-ROBINS AFB, GA	-2.0	63.8

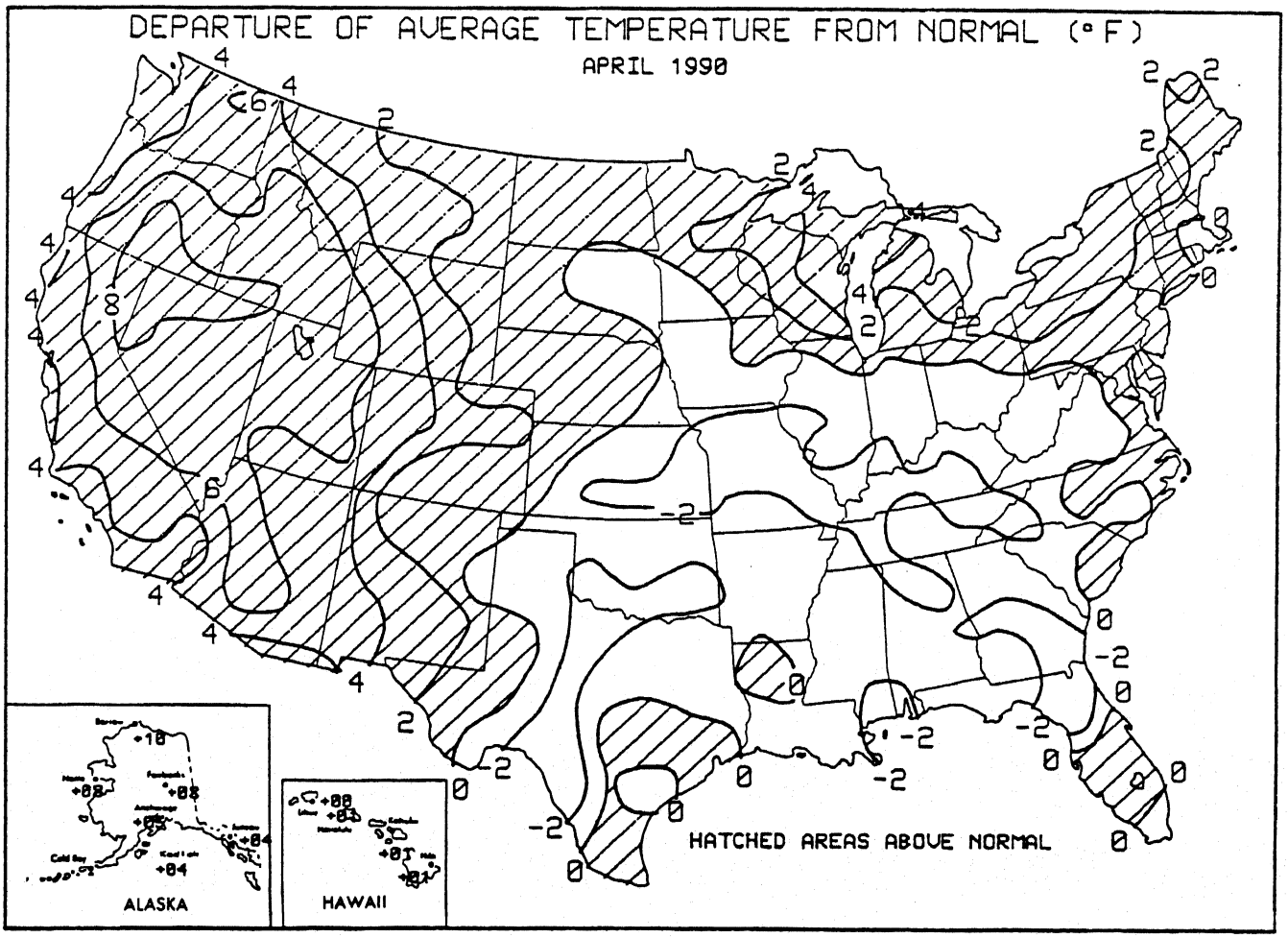


Figure 4. April 1990 average temperature departure from normal (°F). Shaded areas are above normal. Much of the western half and the extreme northern U.S. and along the immediate Atlantic Coast recorded positive monthly temperature departures (up to +8°F in the northern Great Basin) while temperatures across much of the lower Midwest, Southeast, and southern Great Plains averaged slightly below normal.

TABLE 5. RECORD APRIL PRECIPITATION.

STATION	TOTAL (INCHES)	NORMAL (INCHES)	PCT. OF NORMAL	RECORD TYPE	RECORDS BEGAN
ROCHESTER, MN	6.47	2.53	255.7	HIGHEST	1961
KAHALUI, MAUI, HI	0.05	1.07	7.5	LOWEST	1947

Note: Trace precipitation is considered no precipitation. Stations with no precipitation are only included if normal precipitation is 0.25 inches or more.

TABLE 6. RECORD APRIL AVERAGE TEMPERATURES.

STATION	AVERAGE (°F)	NORMAL (°F)	DEPARTURE (°F)	RECORD TYPE	RECORDS BEGAN
BARTER ISLAND, AK	14.8	-0.6	+15.4	HIGHEST	1948
MCGRATH, AK	36.8	27.1	+9.6	HIGHEST	1942
MEDFORD, OR	57.6	50.4	+7.2	HIGHEST	1947
RED BLUFF, CA	65.6	58.8	+6.8	HIGHEST	1878
LEWISTON, ID	57.0	50.2	+6.8	HIGHEST	1951
BURNS, OR	50.0	43.2	+6.8	HIGHEST	1947
TALKEETNA, AK	38.3	32.9	+5.4	HIGHEST	1951
HOMER, AK	40.1	35.1	+5.0	HIGHEST	1951
ANCHORAGE, AK	40.1	35.4	+4.6	HIGHEST	1941
ANNETTE ISLAND, AK	47.4	43.0	+4.4	HIGHEST	1941

TEMPERATURE RANKINGS FOR JAN – APR 1990, BASED ON THE PERIOD 1895 – 1990 (96 YEARS) WHERE 1 = COLDEST AND 96 = WARMEST.

STATE	*RANK*	*STATE*	*RANK*	*STATE*	*RANK*	*STATE*	*RANK*
AL	81	IA	93	NE	91	RI	96
AZ	77	KS	86	NV	80	SC	95
AR	90	KY	96	NH	96	SD	91
CA	69	LA	89	NJ	96	TN	92
CO	86	ME	75	NM	68	TX	78
CT	95	MD	95	NY	95	UT	89
DE	95	MA	93	NC	96	VT	96
FL	95	MI	94	ND	93	VA	96
GA	91	MN	92	OH	95	WA	82
ID	89	MS	88	OK	90	WV	95
IL	94	MO	93	OR	91	WI	95
IN	94	MT	87	PA	95	WY	91

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TABLE 7. RECORD APRIL EXTREME TEMPERATURES.

STATION	EXTREME (°F)	DATE	RECORD TYPE	RECORDS BEGAN
RICHMOND, VA	96	27 APR 90	HIGHEST	1930
DALLAS-FT. WORTH, TX	95	29 APR 90	HIGHEST	1953
CHARLESTON, WV	94	27 APR 90	HIGHEST	1948
BUFFALO, NY	94	28 APR 90	HIGHEST	1943
ROCHESTER, NY	93	28 APR 90	HIGHEST	1941
SYRACUSE, NY	92	28 APR 90	HIGHEST	1950
ALBANY, NY	92	28 APR 90	HIGHEST	1947
BRIDGEPORT, CT	91	28 APR 90	HIGHEST	1948
ALPENA, MI	90	25 APR 90	HIGHEST	1960
HONOLULU, OAHU, HI	89	30 APR 90	HIGHEST	1947
CAPE HATTERAS, NC	89	27 APR 90	HIGHEST	1958
PITTSBURG, PA	89	27 APR 90	HIGHEST	1953
ERIE, PA	89	28 APR 90	HIGHEST	1953
BINGHAMTON, NY	88	28 APR 90	HIGHEST	1952
YOUNGSTOWN, OH	88	27 APR 90	HIGHEST	1943
TOLEDO, OH	88	27 APR 90	HIGHEST	1956
FLINT, MI	87	25 APR 90	HIGHEST	1942
CARIBOU, ME	86	27 APR 90	HIGHEST	1939
SAULT STE. MARIE, MI	85	25 APR 90	HIGHEST	1941
EVANSVILLE, IN	23	07 APR 90	LOWEST	1940

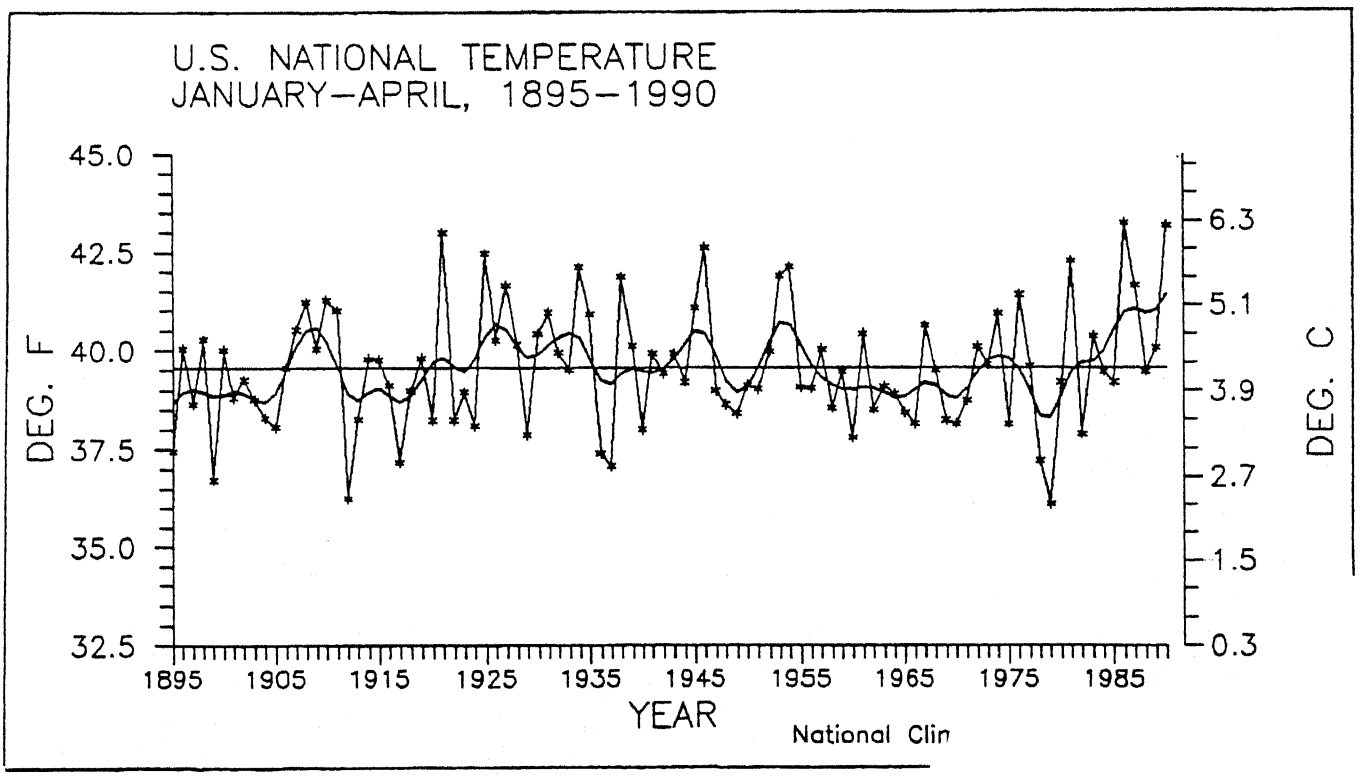


Figure 5. January-April historical U.S. national temperatures, 1895-19
the 15th warmest February, the 10th warmest March, and the 23r
has recorded the SECOND warmest start (Jan.-Apr.) since 1905 ...
for the nation as a whole.

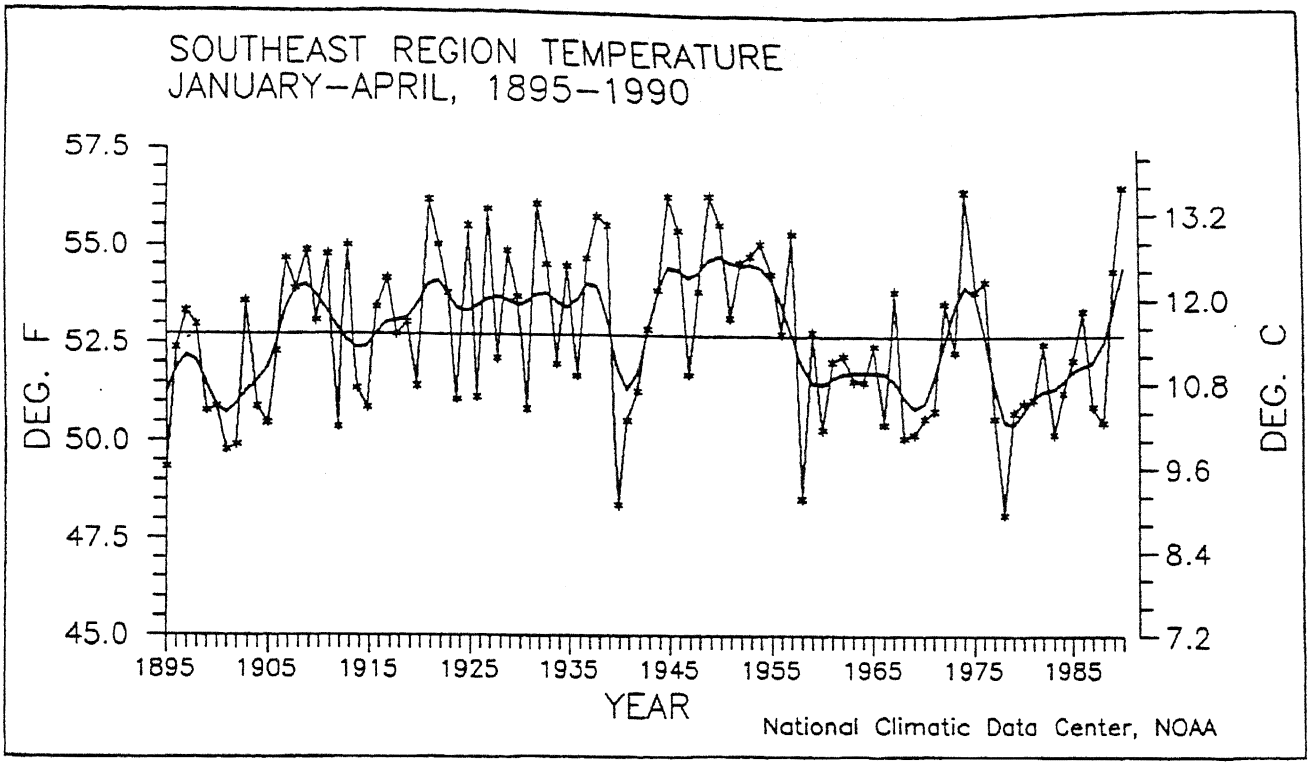


Figure 6. January-April historical temperatures for the Southeast region, 1895-1990. January-April 1990 was the warmest such period on record in the Southeast region (FL, AL, GA, SC, NC, VA). This is quite a contrast from the January-April conditions of the past 30 years when mean regional temperatures were generally in a colder 'mode' as compared to a warmer 'mode' during the first half of the century.

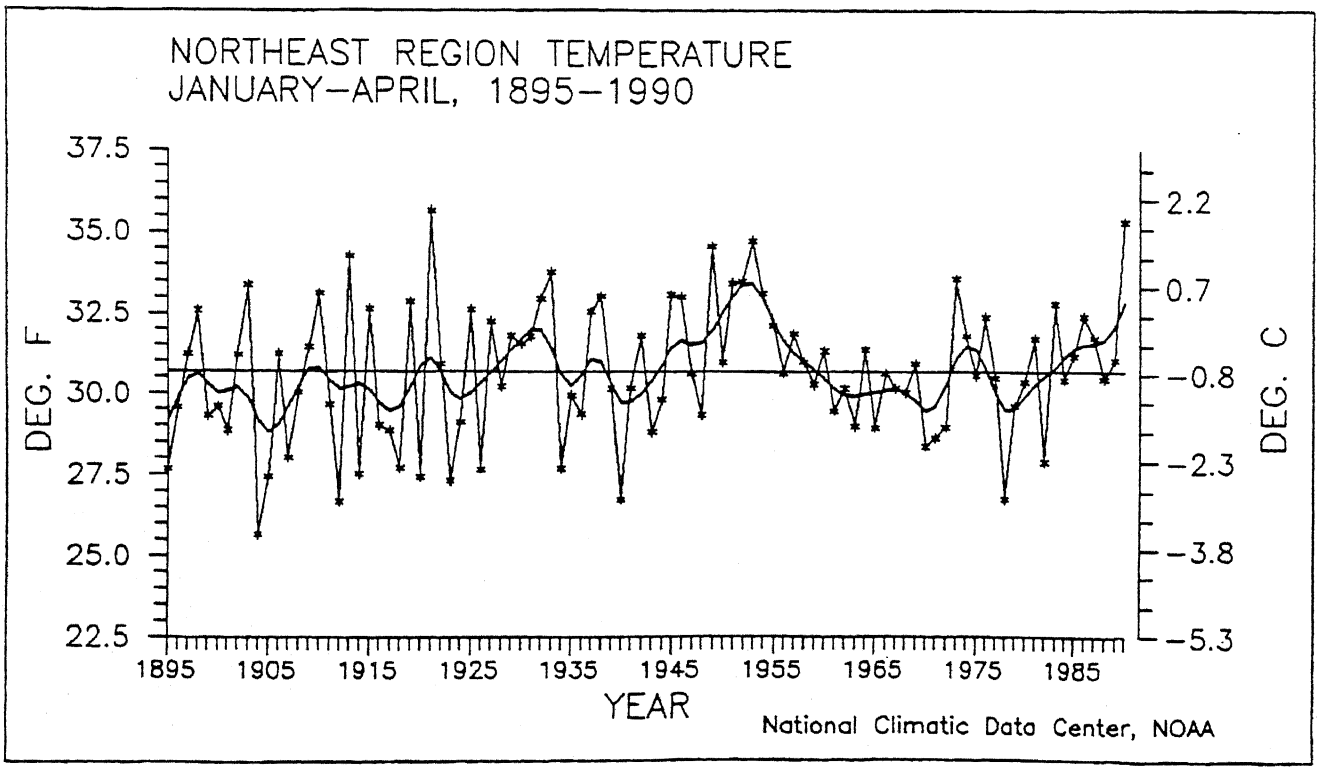


Figure 7. January-April historical temperatures for the Northeast region, 1895-1990. The January-April 1990 period has also been unusually warm in the Northeast region (ME, NH, VT, NY, CT, RI, MA, NJ, MD, DE, PA) as the first four months of 1990 were ranked second behind January-April 1921.

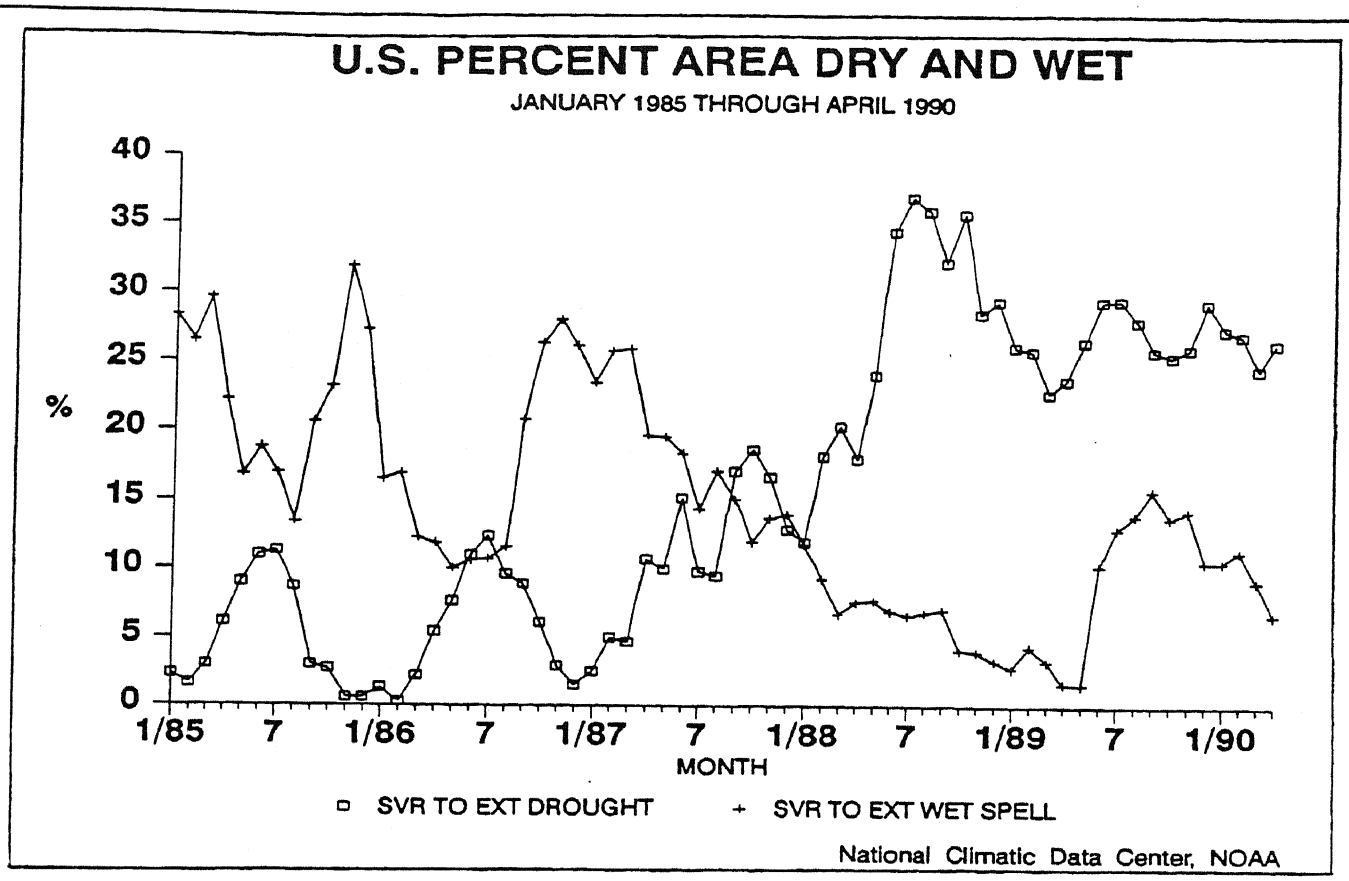


Figure 8. U.S. percent of area dry (PDI<-3) and wet (PDI>+3) based upon the Palmer Drought Index (PDI) from January 1985-April 1990. Although generous rainfall alleviated the long-term drought in southern Texas, more than 25% of the country continued in the severe to extreme drought category. Only 9 other April's have had a greater drought area (not shown). Meanwhile, about 7% of the nation was in the severely to extremely wet category. The size of the wet area has been steadily decreasing over the last 3 months as previously saturated portions of the Southeast and New England have returned to near normal moisture levels.

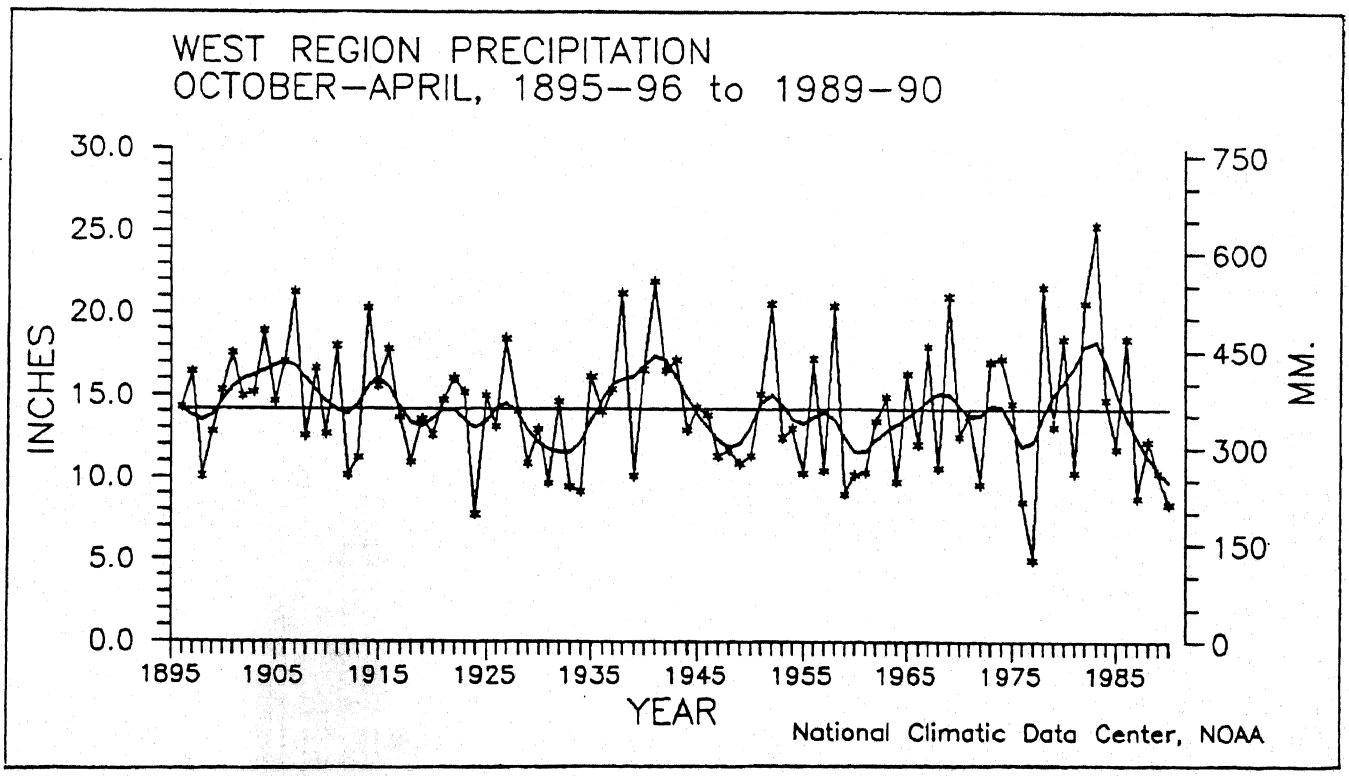


Figure 9. October-April historical precipitation for the Western region (CA, NV), 1895-1896 to 1989-1990. The October-April period, normally considered the rainy season in the Far West, has been extremely dry this season, ranking as the THIRD driest such period on record. The last four Oct.-Apr. periods have been very dry, with the long-term filtered curve (thick line) reaching alarmingly low levels.

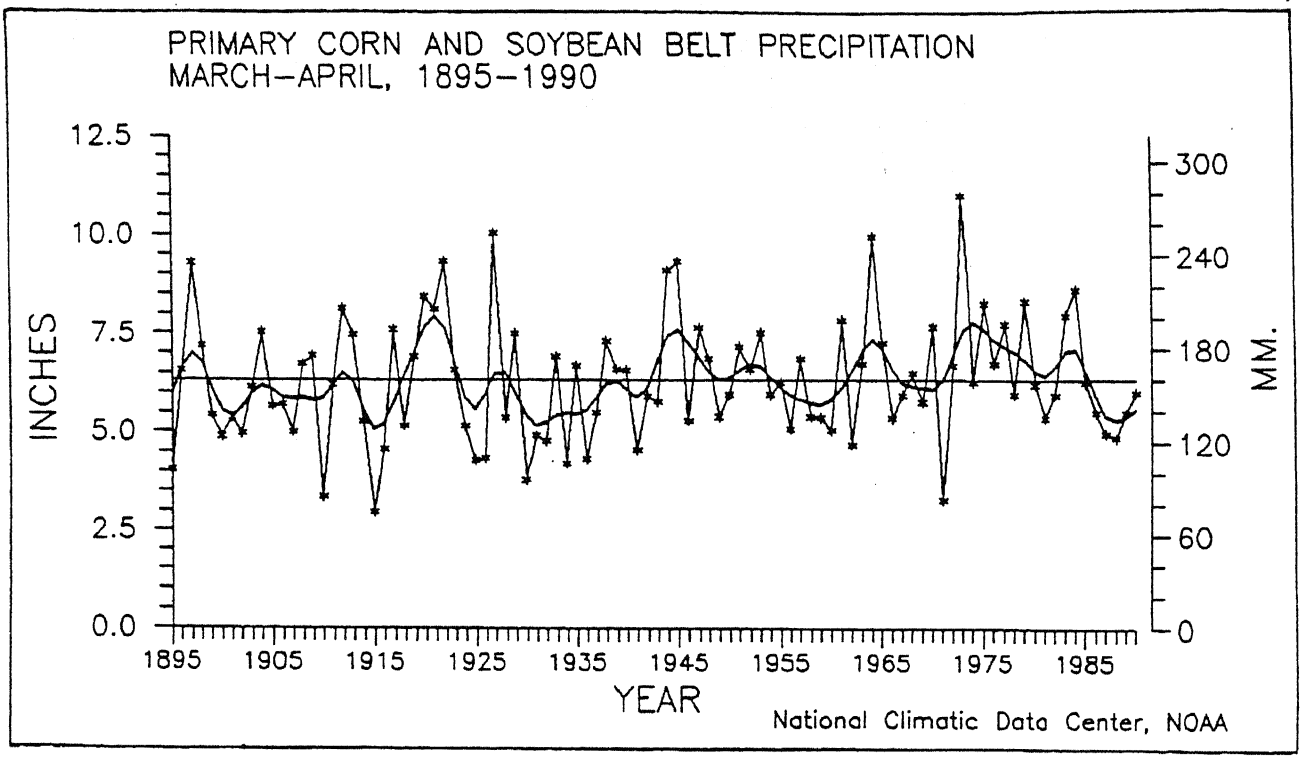


Figure 10. March-April historical precipitation for the primary corn and soybean belt, 1895-1990. The area encompassing the primary corn and soybean belt was depicted in the WCB #90/14 dated April 7, 1990, page 20, or roughly the triangle extending from northeastern Louisiana to southeastern Michigan and eastern South Dakota. Although the March-April 1990 precipitation was slightly below the long-term mean, this year early-growing season's precipitation was an improvement over the past few years, especially 1988. The long-term filter indicates that the late-1980's dryness was not unprecedented, and that the 1970's and the early-1980's were a period of unusual wetness.

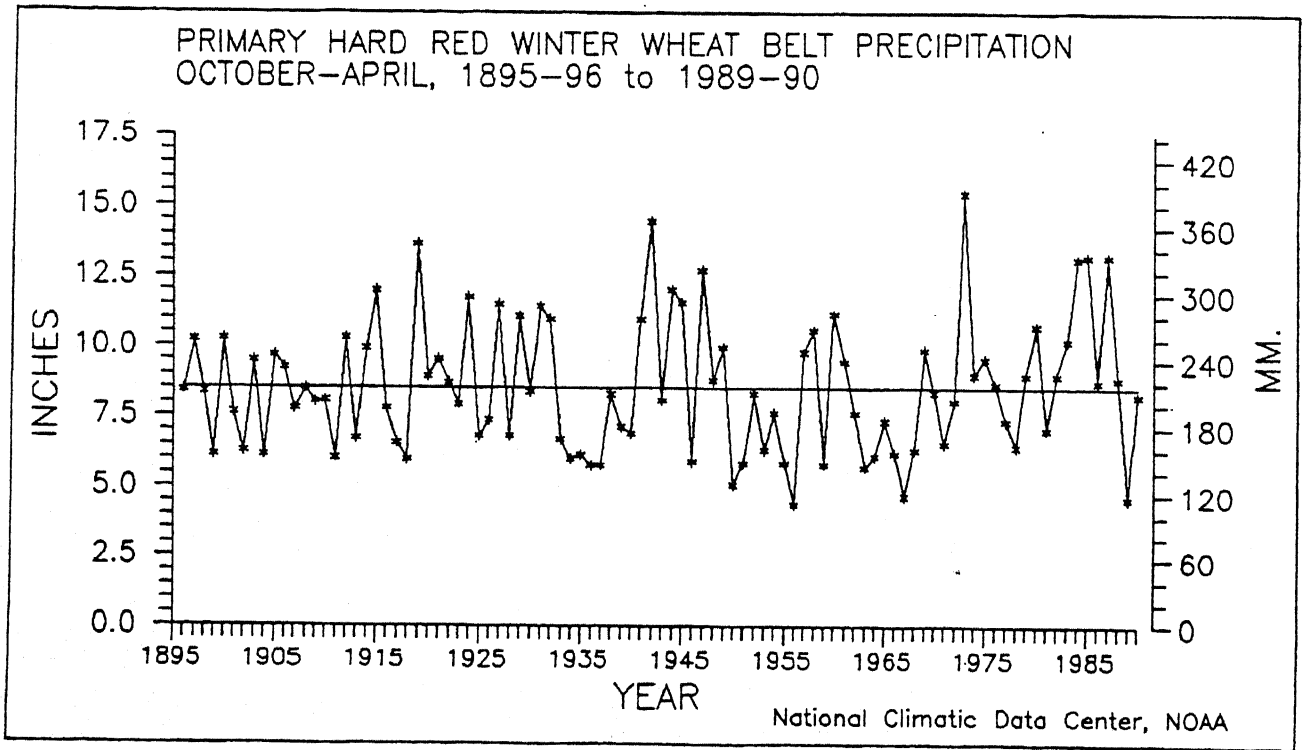


Figure 11. October-April historical precipitation for the primary hard red winter wheat belt, 1895-1896 to 1989-1990. Abundant precipitation during 1990 has compensated for the unusually dry conditions of late 1989 across most of the primary hard red winter wheat belt (roughly southern and western Nebraska to the Texas panhandle; see WCB #90/14, page 20). This year's total Oct.-Apr. precipitation across this area averaged near the long-term mean. Except for the dryness of 1988-1989, which was comparable to the droughts of the 1930's, 1950's, and 1960's, the last 9 years have been near or above the long-term mean.

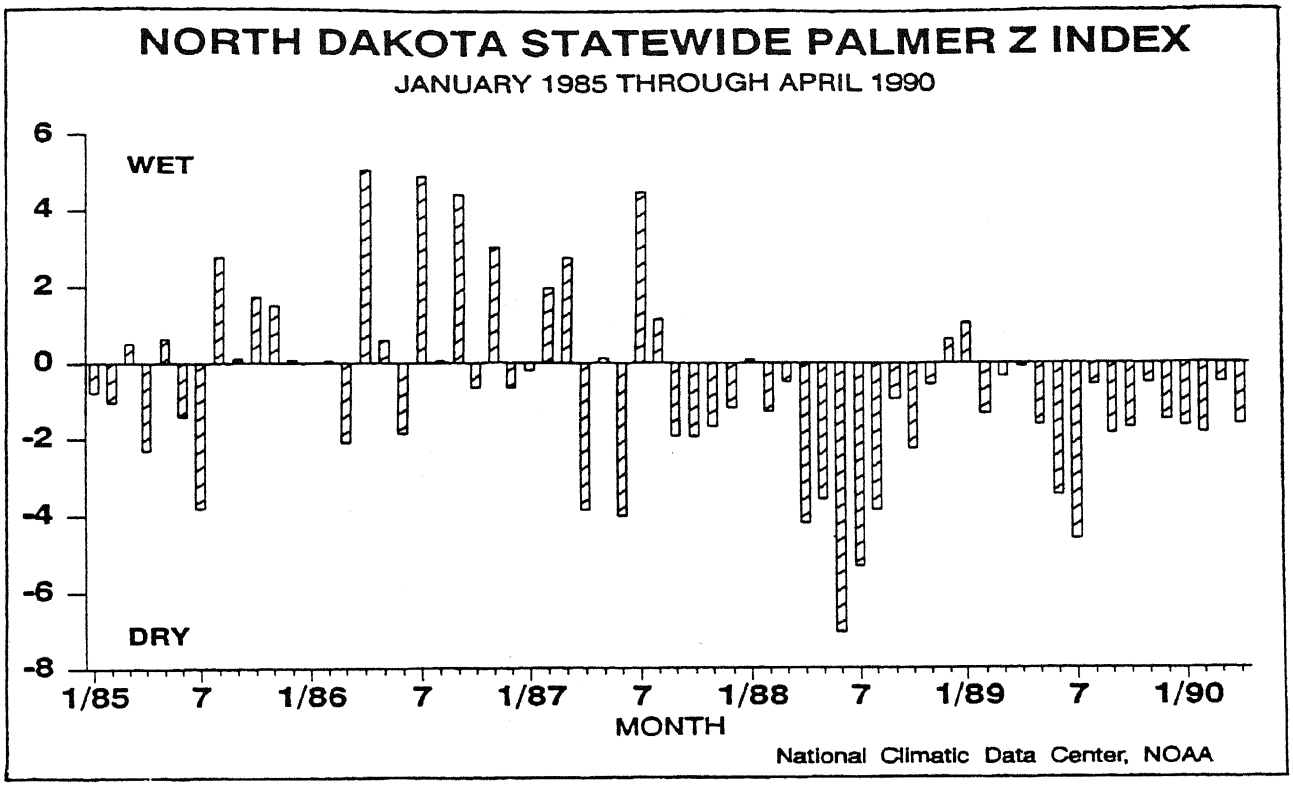


Figure 12. North Dakota statewide Palmer Z Index January 1985-April 1990. While wet weather has soaked much of the southern and central Plains in 1990, the past 4 months have been unusually warm and dry in parts of the northern Plains. The Palmer Z Index incorporates precipitation and temperature conditions into a water balance model. Dry conditions will decrease moisture supplies, and warm conditions increase moisture demand in the model. The combination of warm and dry conditions will result in a negative index value indicative of short-term (e.g. monthly) drought. Since September 1987, North Dakota has been experiencing almost constant dry conditions, allowing the state little chance to recover from the especially severe conditions of the Spring and Summer 1988.

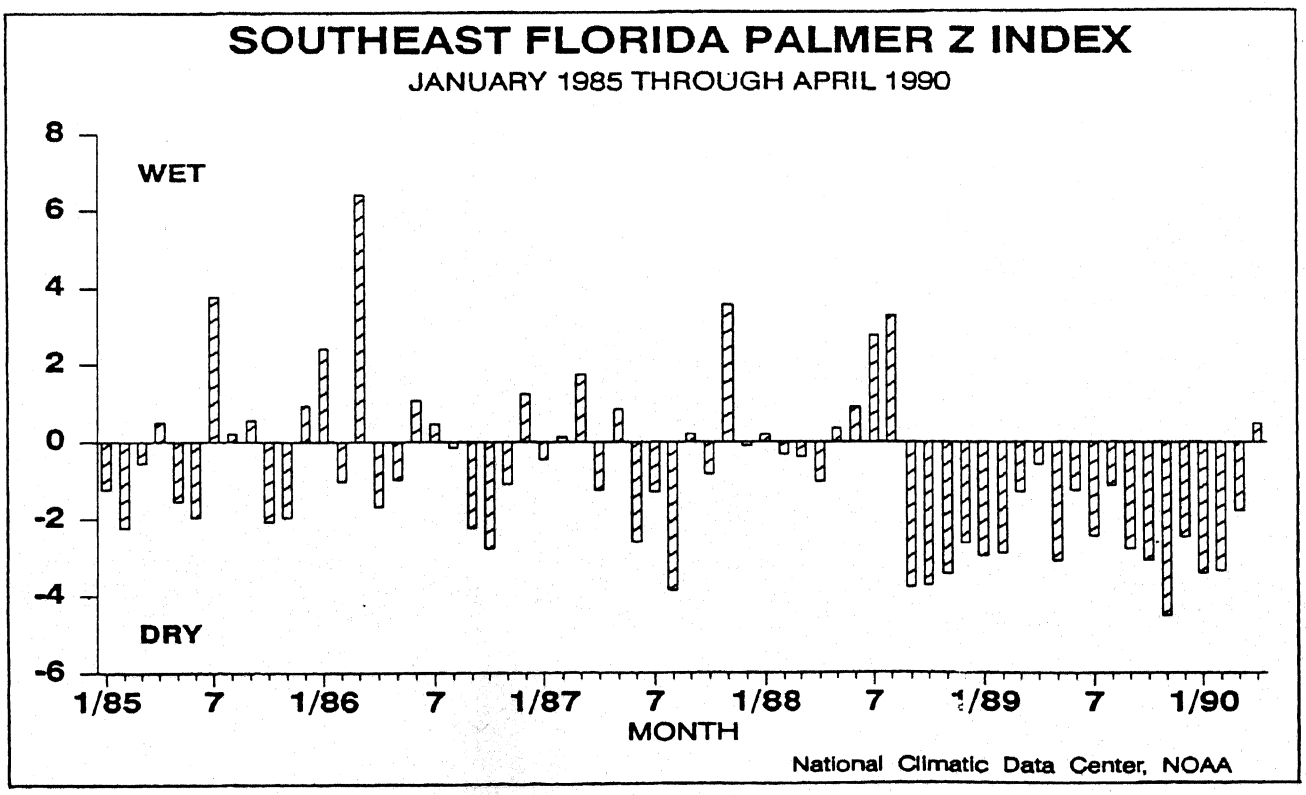


Figure 13. Southeast Florida Palmer Z Index January 1985-April 1990. The text under Figure 12 explains the Palmer Z Index. Consistently dry conditions since September 1988 have put southeastern Florida into the extreme Palmer drought category. For a change, the April 1990 Z value was positive (wet), breaking a string of 19 consecutive months with negative (dry) Z values.

STATISTICS FOR SELECTED RIVER BASINS: PRECIPITATION RANKING FOR OCT–APR 1989–90, WHERE RANK OF 1 = DRIEST, 95 = WETTEST, BASED ON THE PERIOD 1895 TO 1990; AREAL PERCENT OF THE BASIN EXPERIENCING SEVERE OR EXTREME LONG–TERM (PALMER) DROUGHT, AND AREAL PERCENT OF THE BASIN EXPERIENCING SEVERE OR EXTREME LONG–TERM (PALMER) WET CONDITIONS, AS OF APRIL 1990. RIVER BASIN REGIONS AS DEFINED BY THE U.S. WATER RESOURCES COUNCIL.

RIVER BASIN	PRECIPITATION RANK	%AREA DRY	%AREA WET
MISSOURI	33	32.2	0.0
PACIFIC NORTHWEST	24	40.8	0.0
CALIFORNIA RIVER	4	82.2	0.0
GREAT BASIN	15	39.3	0.0
UPPER COLORADO	2	100.0	0.0
LOWER COLORADO	18	92.1	0.0
RIO GRANDE	54	1.6	0.0
ARKANSAS–WHITE–RED	66	0.0	29.0
TEXAS GULF COAST	50	0.0	0.0
SOURIS–RED–RAINY	22	65.4	0.0
UPPER MISSISSIPPI	27	19.8	0.0
LOWER MISSISSIPPI	69	0.0	20.8
GREAT LAKES	40	15.5	4.7
OHIO RIVER	33	0.0	0.0
TENNESSEE RIVER	51	0.0	12.3
NEW ENGLAND	45	0.0	0.0
MID–ATLANTIC	53	0.0	6.0
SOUTH ATLANTIC–GULF	78	4.9	35.8

National Climatic Data Center

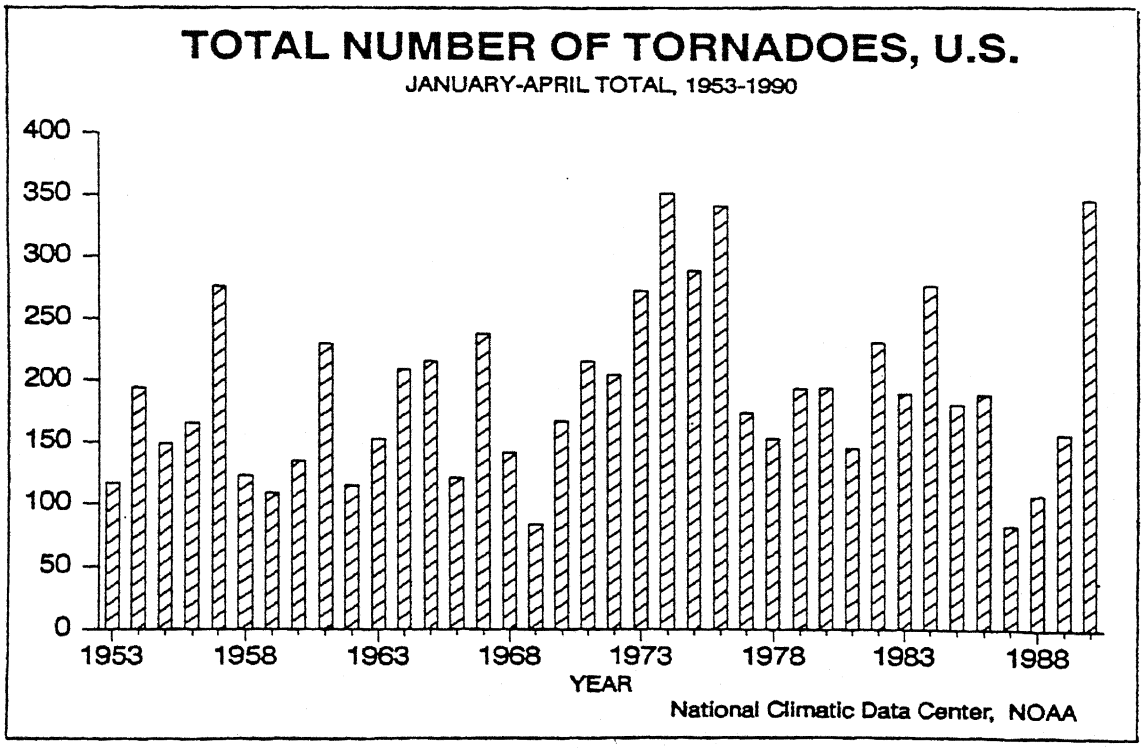
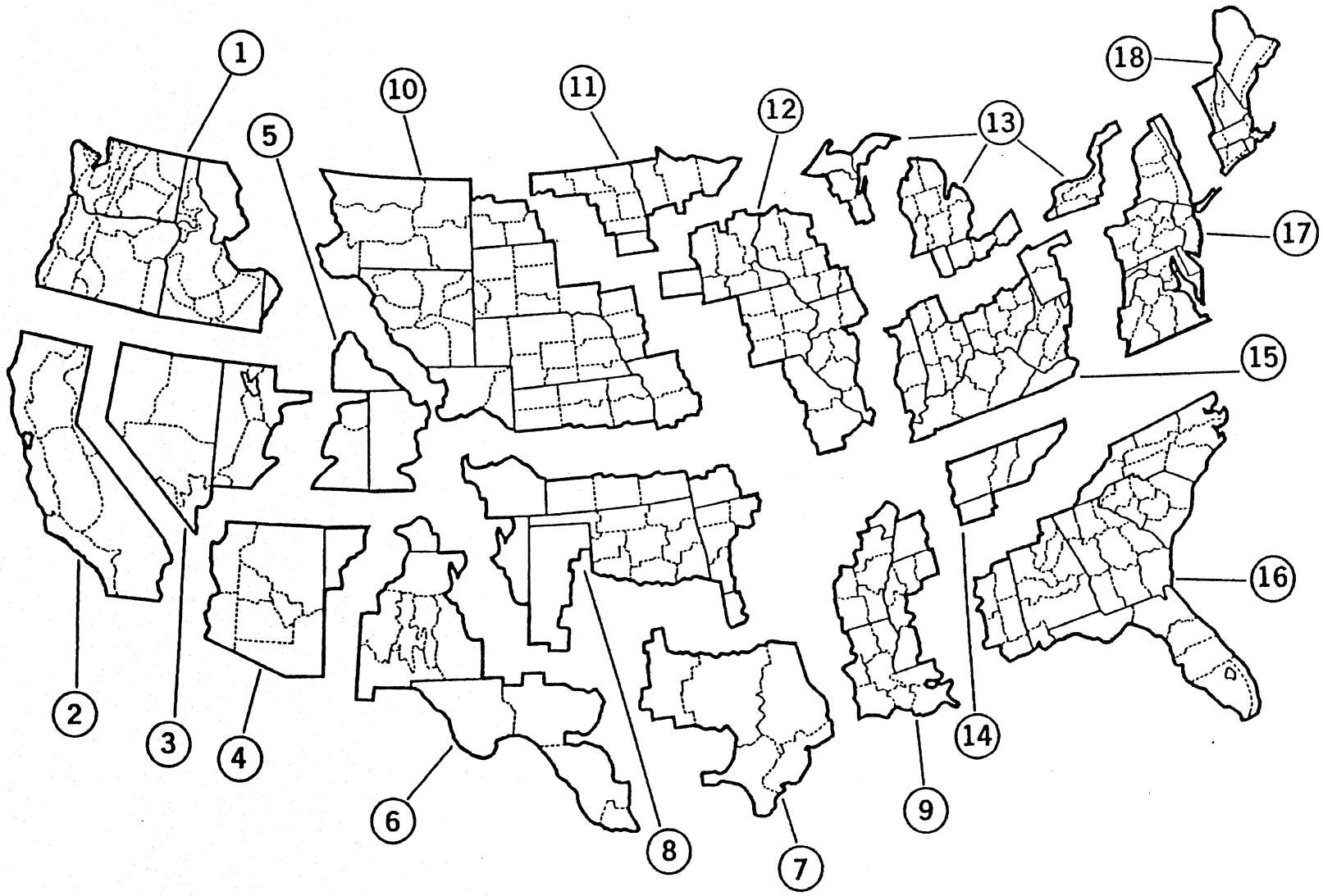
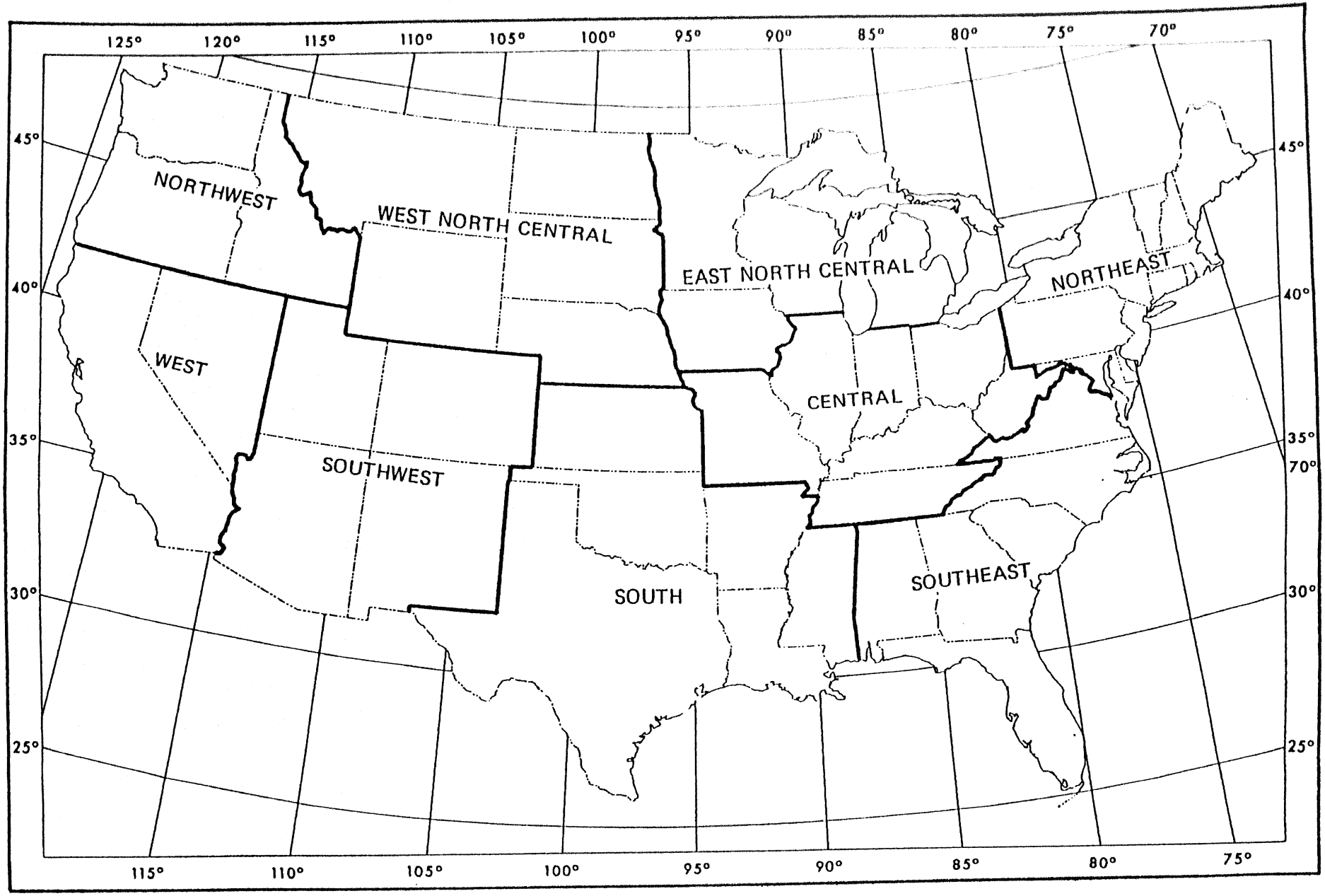


Figure 14. January-April total number of U.S. tornadoes, 1953-1990. According to preliminary data from the National Weather Service, there were 121 April tornadoes across the contiguous U.S. This year's total is a near-record value and is in sharp contrast to the generally lower values since the late-1970's.



1. Pacific Northwest Basin
2. California Basin
3. Great Basin
4. Lower Colorado Basin
5. Upper Colorado Basin
6. Rio Grande Basin
7. Texas Gulf Basin
8. Arkansas-White-Red Basin
9. Lower Mississippi Basin
10. Missouri Basin
11. Souris-Red-Rainy Basin
12. Upper Mississippi Basin
13. Great Lakes Basin
14. Tennessee Basin
15. Ohio Basin
16. South Atlantic Gulf Basin
17. Mid-Atlantic Basin
18. New England Basin

NOAA / National Climatic Data Center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NORTHWEST
WEST NORTH CENTRAL
EAST NORTH CENTRAL
NORTHEAST
WEST
CENTRAL
SOUTHWEST
SOUTH
SOUTHEAST